INFORMATION TO USERS

This reproduction was made from a copy of a document sent to us for microfilming. While the most advanced technology has been used to photograph and reproduce this document, the quality of the reproduction is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help clarify markings or notations which may appear on this reproduction.

1. The sign or “target” for pages apparently lacking from the document photographed is “Missing Page(s)”. If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure complete continuity.

2. When an image on the film is obliterated with a round black mark, it is an indication of either blurred copy because of movement during exposure, duplicate copy, or copyrighted materials that should not have been filmed. For blurred pages, a good image of the page can be found in the adjacent frame. If copyrighted materials were deleted, a target note will appear listing the pages in the adjacent frame.

3. When a map, drawing or chart, etc., is part of the material being photographed, a definite method of “sectioning” the material has been followed. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.

4. For illustrations that cannot be satisfactorily reproduced by xerographic means, photographic prints can be purchased at additional cost and inserted into your xerographic copy. These prints are available upon request from the Dissertations Customer Services Department.

5. Some pages in any document may have indistinct print. In all cases the best available copy has been filmed.
Gil, David

DISTRIBUTIVE NUMERALS

University of California, Los Angeles

Ph.D. 1982

University Microfilms International 300 N. Zeeb Road, Ann Arbor, MI 48106

Copyright 1982 by Gil, David

All Rights Reserved
UNIVERSITY OF CALIFORNIA

Los Angeles

Distributive Numerals

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Linguistics

by

David Gil

1982
The dissertation of David Gil is approved

Tyler J. Burge

David B. Kaplan

Robert P. Stockwell

Sandra A. Thompson

Edward L. Keenan, Committee Chair

University of California, Los Angeles

1982
To my mother, Sonia Glucklich;

and in the memory of my father, Joseph Glucklich.
"Tres equitum numero turmae ternique vagantur ductores; pueri his seni quemque secuti agmine partito fulgent paribusque magistris"

"... The companies of horse are three; three chiefs ride to and fro, And, following each, a band of twice six boys, The troop trisected, with like leaders, shine"

(Virgil, The Aeneid V 560-562)

"I heard the old, old men say, 'Everything alters, And one by one we drop away'"

(W. B. Yeats, The Old Men Admiring Themselves in the Water)
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>x</td>
</tr>
<tr>
<td>Vita and Publications</td>
<td>xiii</td>
</tr>
<tr>
<td>Abstract</td>
<td>xv</td>
</tr>
<tr>
<td>Chapter 1</td>
<td></td>
</tr>
<tr>
<td>1. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Philosophical Preliminaries</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Methodological Preliminaries</td>
<td>5</td>
</tr>
<tr>
<td>1.3 Organizational Preliminaries</td>
<td>8</td>
</tr>
<tr>
<td>Footnotes</td>
<td>9</td>
</tr>
<tr>
<td>Chapter 2</td>
<td></td>
</tr>
<tr>
<td>2. Distributive Numerals: A First Exploration</td>
<td>11</td>
</tr>
<tr>
<td>2.1 Adnominal Distributive Numerals</td>
<td>13</td>
</tr>
<tr>
<td>2.2 Adverbial Distributive Numerals</td>
<td>17</td>
</tr>
<tr>
<td>2.3 Some Preliminary Generalizations</td>
<td>18</td>
</tr>
<tr>
<td>2.3.1 Morphology</td>
<td>19</td>
</tr>
<tr>
<td>2.3.2 Syntax</td>
<td>23</td>
</tr>
<tr>
<td>2.3.3 Semantics</td>
<td>24</td>
</tr>
<tr>
<td>2.4 The Composite Nature of Distributive Numerals</td>
<td>29</td>
</tr>
<tr>
<td>Footnotes</td>
<td>30</td>
</tr>
<tr>
<td>Chapter 3</td>
<td></td>
</tr>
<tr>
<td>3. The Syntax and Semantics of Numerals</td>
<td>32</td>
</tr>
<tr>
<td>3.1 Absolute Numeral Series</td>
<td>32</td>
</tr>
<tr>
<td>3.1.1 Cardinal Numerals</td>
<td>32</td>
</tr>
<tr>
<td>3.1.2 Non-Cardinal Adnominal Numerals</td>
<td>33</td>
</tr>
</tbody>
</table>
6.5 Other Distributive Expressions in Tagalog ... 190
  6.5.1 Distributive Quantifier Expressions ... 190
  6.5.2 Distributive Monetary Expressions ... 191
  6.5.3 A Nascent Distributive Numeral Formative: bawat 192

Footnotes ... 196

Chapter 7

7. Distributive Numerals in Georgian ... 202
  7.1 Some Features of Georgian Grammar ... 203
      7.1.1 Case Marking ... 203
      7.1.2 Nouns, Adjectives, and Numerals ... 205
  7.2 Reduplication and Distributivity ... 208
      7.2.1 Distributive Adjectives ... 209
      7.2.2 Distributive Adverbs ... 218
      7.2.3 Distributive Verbs ... 220
      7.2.4 Distributive Nouns ... 227
      7.2.5 Summary ... 228
  7.3 Stacked Numerals ... 229
  7.4 Other Distributive Expressions in Georgian ... 241
      7.4.1 titó ... 241
      7.4.2 q'oveli ... 244

Footnotes ... 246

Chapter 8

8. Distributive Numerals in Maricopa ... 254
  8.1 Some Features of Maricopa Grammar ... 255
      8.1.1 Nouns and Verbs ... 255
      8.1.2 Switch Reference ... 260
8.1.3 Conjunctions .......................... 265
8.2 The Verbal Distributive Suffix -xper. .......... 271
  8.2.1 Simple Clauses .......................... 271
  8.2.2 Complex Clauses ......................... 273
8.3 Verbal Ablaut: Plurality or Distrubitivity? .... 276
8.4 Complex Clauses: A Puzzle .................... 280
  8.4.1 Conjunctions .......................... 280
  8.4.2 Stacked Numerals ....................... 287
  8.4.3 Two Possible Approaches ................. 294
Footnotes ...................................... 301

Chapter 9

9. Linguistic Universals Governing Distributive Numerals. ... 310
  9.1 Cross-Linguistic Distribution of Distributive Expressions ......................... 311
  9.2 Morphosyntactic Universals .................. 319
  9.3 Semantic Universals ....................... 335
  9.4 Adnominal Distributive Numerals and the N/N
      Distinction ............................. 348
Footnotes ...................................... 355

Chapter 10

10. Conclusion ............................... 364

Bibliography .................................. 368

ix
Acknowledgments

It is a pleasure to acknowledge the many people who made this dissertation possible.

First, my advisor, Edward Keenan. He brought me to UCLA when all other avenues to a Ph.D. seemed closed, and set me going on the right track. He was extremely generous with his time on those happily quite frequent occasions when we both found ourselves in the same corner of the globe. His influence on the content and spirit of this dissertation will be appreciated by all who are acquainted with his work. If not for Ed, this dissertation would not have been written.

The five members of my Ph.D. committee—Tyler Burge, David Kaplan, Edward Keenan, Robert Stockwell, and Sandy Thompson—are directly responsible for the number of pages of this dissertation remaining in the three-digit range, and for its being completed in the present decade. They continually refused to let me put in everything I had to say about the world.

The Department of Linguistics at UCLA provided me with one (net) or three (gross) of the best years of my life—both individually and collectively (cf. chapter 4 for discussion of individual vs. collective interpretations). Thanks to Peter Ladefoged and Robert Stockwell who were chairpersons during my stay, thanks to the faculty, thanks to the students—and thanks to Anna Meyer and Ma Anand Vimal, without whom it is difficult to imagine the Department, and, ipso facto, this dissertation.
Many colleagues will recognize their substantive contributions to the contents of this dissertation; among these are Alexander Grosu, Michael Hammond, Richard Janda, Pamela Munro, Russ Schuh, Tracy Thomas-Flinders, and two anonymous referees from Linguistics and Philosophy.

Linguists are particularly fortunate in being in a position to thank their actual objects of investigation (or, if you will, the human beings behind the distributive numerals). The following long list of people were so kind as to contribute their syntactic and semantic intuitions to this study: Benzie Arditti (Turkish), D. N. Basu (Bengali), Manana Bat-Hana (Georgian), Fillipo Beghelli (Italian), Maruli Butar-Butar (Batak), Emily Cruz (Tagalog), Alexander Grosu (Rumanian), Polly Heath (Maricopa), Yedida Heymans (Dutch), Tamara Japaridze (Georgian), Jonas Nartey (Gã), Magnus Nordin (Swedish), Chen Ping (Mandarin Chinese), Ilan Roziner (Russian), Elisha Shalangwa (Bura), Sarah Siman-Tov (Bulgarian), Nôbuko Sugamoto (Japanese), Eleanor Vasco (Bikol and Tagalog). Some of these people withstood hour after grueling hour of interrogation, staring at mimeographed drawings of little purple men carrying little green suitcases in seemingly infinite permutations—and, perhaps, wondering if this is how adult men and women make a living in universities.

An additional class of people generously contributed their linguistic albeit non-native knowledge of various languages; these were Edward Keenan (Malagasy), Pamela Munro (Pima), Baruch Podolsky (Hindi), Russ Schuh (Bura, Hausa, and Ngizim), Ran Yaniv (Persian).

This dissertation also profited from pecuniary support from a
number of sources. A UCLA Travel and Research Grant enabled me to work on Batak, Buginese, Inunhan, and Tagalog, during the summer of 1980. The UCLA Department of Linguistics supported my work with speakers of Tagalog and Georgian, and--through a Field Methods class taught by Pamela Munro in which I participated--Maricopa. The Tel Aviv University Department of Linguistics enabled me to work with a speaker of Georgian within the framework of a Field Methods class which I taught. And as for the bread and butter, the burden was shared by an NSF Grant BNS 79-14141 and my mother.

The excellent (I hope) job of typing the manuscript was performed by Ma Anand Vimal, who has promised me not to make any surreptitious additions to the text.

Finally--and foremost--this dissertation would not have been possible if not for my parents, Sonia and Joseph Glucklich. To even attempt to portray their influence upon the course of my education would be inappropriate to the genre of dissertation acknowledgments. I am sorry that my father did not live to see the completion of this work.
VITA

November 1, 1953--Born, London, Great Britain
1972--BSc., Massachusetts Institute of Technology
1972-1977--Israeli Defense Forces
1978--M.A., Tel Aviv University
1977-1980--Teaching Assistant, Tel Aviv University
1980--Field Work, South East Asia
1980-1981--Research Assistant, University of California, Los Angeles
1981-1982--Instructor, Tel Aviv University

PUBLICATIONS


Gil, David (to appear)  "Quantifier Scope, Linguistic Variation, and Natural Language Semantics", Linguistics and Philosophy.


ABSTRACT OF THE DISSERTATION

Distributive Numerals

by

David Gil

Doctor of Philosophy in Linguistics

University of California, Los Angeles, 1982

Professor Edward L. Keenan, Chair

This dissertation provides a syntactic and semantic description of distributive numerals—expressions such as English in threes, Russian po tri, and Latin terni.

The goal of the dissertation is to contribute towards the establishment of a more adequate empirical foundation upon which theories of natural language quantification may be based.

Chapter 1 contains an introduction to the philosophical and methodological assumptions underlying the present work, emphasizing the need to investigate properties of structurally diverse languages as a prelude to the construction of linguistic theories of quantification. Chapter 2 presents an overview of the morphology, syntax, and semantics of distributive numerals. Chapters 3 and 4 deal with the two major constituent parts of distributive numerals—numerals and distributivity respectively. In these two chapters, it is argued that both notions are of greater generality than is commonly assumed: thus, numerals may qualify not only nouns, but, also, verbs and adjectives; moreover, the binary relation of distributivity may obtain between expressions of
arbitrary syntactic categories—e.g. noun and noun, noun and verb, noun and adjective, noun and numeral. Chapter 5 presents an analysis of distributive numerals incorporating the insights developed in chapters 3 and 4. In chapter 5, it is argued that the interpretations of constructions involving distributive numerals may be accounted for by assuming that distributive numerals induce distributivity across a variety of syntactic domains—clausally, over nominal or verbal phrases, and phrasally, over conjunctions, or over a possible covert numeral classifier constituent. Chapters 6–8 provide detailed analysis of distributive numerals in three particular languages—Tagalog (Philippine), Georgian (South Caucasian), and Maricopa (Yuman, American Indian) respectively. In these chapters, it is shown that distributive numerals may belong to broader categories of distributive expressions, e.g. distributive adjectives, distributive verbs. Chapter 9 presents some cross-linguistic universals governing the morphology, syntax, and semantics of distributive numerals; one important result to emerge is that a certain type of distributive numeral occurs only in languages that do not distinguish between common and determined noun phrases, or, equivalently, between count and mass nouns. And chapter 10 concludes by considering, once again, the importance of basing theories of natural language quantification on firm cross-linguistic foundations.
Chapter 1

1. Introduction

This dissertation is concerned with the syntax and semantics of distributive numerals: expressions such as Latin *terni*, Russian *po tri*, or Georgian *sam-sami*, glossed, alternatively, as "three each", "three at a time", or "sets of three".

Why should anyone wish to study distributive numerals? The most obvious answer is, simply, because they are there, a part of natural language, present in a large number of genetically, areally, and typologically diverse languages. And, moreover, their syntax and semantics has not, hitherto, been extensively studied. However, one might also seek a somewhat deeper motivation for this study—namely, a philosophical perspective, providing it with a raison d'être, and, perhaps, in addition, with a set of methodological principles. Hence this introduction.

1.1 Philosophical Preliminaries

My particular interest in distributive numerals stems from an ongoing preoccupation with the nature of two human mental activities or products, language and mathematical reasoning—and with their manifold interrelationships and modes of interaction. Are mathematics and mathematical logic concerned with language-independent universal truths, or is it the case, for example, that "the whole logic of Aristotle is nothing but a consideration of Greek grammar from an interesting point of view" (Mauthner 1901-1902, translated and cited by Weiler 1973:143)? Is language "an essential part of the scientific enterprise, even in
mathematics" (Popper 1972:136), or, conversely, is it the case that "the traditional notions of validity and inference are a part of linguistics" (Barwise and Cooper 1981:203)? More generally, are language and mathematical reasoning two mutually autonomous systems, as believed by many linguists, notably Chomsky (1975, 1977, 1980), and nearly all mathematicians, or can it be shown that there is a common thread running through both? And, if this thread exists, what is its nature? Elsewhere (Gil to appear a), I have attempted to formalize some of these questions in a more precise manner.

Over and beyond the philosophical issues involved, however, some of the above questions may lead also to the formulation of testable empirical hypotheses. In particular, they may provide strong motivation for an enterprise centrally located within the mainstream of current linguistics—namely, the construction of a syntax and semantics for quantification in natural language. Thus, for example, a linguistically motivated logic for quantification would be a natural candidate for the common thread sought to unite language and mathematical reasoning. Or, viewed from a slightly different perspective, cross-linguistic variation in the syntax and semantics of quantification would seem prima facie, to bear on the issue of universality vs. relativity of mathematics and mathematical logic. This, then, is the major reason why I became interested in the development of a theory of quantification in natural language.

Of course, natural language quantification is a major concern of two foremost current linguistic schools of thought: Extended Standard Theory and Formal Semantics (Montague, Keenan-Faltz, etc.). In the
course of my work, however, it soon became apparent that with respect to quantification, at least, these two theories are sorely lacking in adequate empirical foundations. First, due to a burgeoning interest (justified in and of itself) with concepts of ever-increasing abstraction, one major goal of linguistics, namely, the specification of sound-meaning correspondences in language, fell, somehow, by the wayside. To use Chomsky's (1965, 1968) phraseology, explanatory adequacy was bought at the cost of observational adequacy; equivalently, borrowing terms proposed by Sober (1975), informativeness increased at the expense of support. Theoretical edifices of great beauty and intricacy have, in recent years, been frequently constructed upon judgements of grammaticality or truth conditions that are not shared by the linguist across the corridor, let alone the man in the street. Secondly, these two approaches have, until very recently, shown little or no concern whatsoever with patterns of variation--cross-linguistic, dialectal, idiolectal, or in the judgements of a single speaker over time. Even if--as is argued by Chomsky (1975, 1977, 1980)--some linguistic universals may be devined by a linguist's introspective study of his/her own idiolect, other universals can quite obviously be discovered only through a detailed examination of many idiolects, dialects, and languages. In Gil (1982b, to appear c) I attempt to formulate and defend a critique of the empirical foundations of Extended Standard Theory and Formal Semantics along the above lines, with particular reference to their treatment of quantification. It is not my intent, however, to reproduce any of these arguments here, since I would like this dissertation to remain clear of any form of polemic.\(^1\)
Accusations such as the above have of course been leveled against Extended Standard Theory and Formal Semantics over and over again in the recent literature—cf. Bickerton (1976) and Givón (1979) for just two representative examples. In one important respect, however, I part ways with many of these critics: I do not believe that the baby should be thrown out with the bathwater. In spite of their shortcomings, Extended Standard Theory and Formal Semantics are, to my mind, two of the best theories linguistics has to offer right now; their ailments should accordingly be remedied through therapy, not euthanasia. More specifically, it seems to me that a major research task facing any would-be theory of natural language quantification is the construction of an adequate empirical foundation upon which the theoretical edifices may, in good time, be erected. Some preliminary steps in this direction are taken in a cross-linguistic questionnaire survey dealing with quantifier scope reported on in Gil (1982a,b, to appear c). The present dissertation may be viewed as another chain in this enterprise, that is, as a contribution towards an adequate empirical foundation for a theory of quantification in natural language.

The goal of this dissertation is to provide a study of the syntax and semantics of distributive numerals in a representative sample of the world's languages. Incorporating as they do the two notions of number and distributivity, distributive numerals ought clearly to occupy a central position in any linguistic theory of quantification. Instead, some of my best linguistic friends, perhaps most, have never even heard of them. With this study, I hope to right this injustice. In most part, the dissertation is descriptively oriented; no logical
forms are proposed, no formal syntax or semantics developed. This is
due simply to limitations on the dissertation's scope, and the necessity
--as argued above--to deal with first things first. Nevertheless, it
is hoped that the theoretically minded reader will be able to note--over
and above the few theoretical implications that are briefly discussed--
the many further implications of the data and analyses presented herein
that are left implicit. However, if this study may be characterized as
possessing a theme beyond its immediate concern with distributive numer-
als, it is that to understand language--and perhaps, also, other mental
activities, e.g. mathematical reasoning--we must show a much greater
degree of respect than is currently fashionable towards the actual down-
to-earth observable linguistic facts.

1.2 Methodological Preliminaries

When, in fact, we begin to investigate the world's many languages,
we are at once confronted with a conflict between two different ap-
proaches--the universalist and the relativist. Do we seek the common
to all languages, or that which sets each language apart from every
other? These two alternatives appear most clearly in the work of
Wilhelm von Humboldt, who speaks, in one breath, as it were, of an
"objective spirit" common to all languages, and an "inner form" charac-
terizing each language individually. Recent work in linguistics, e.g.
Chomsky (1979), Keenan (1978a,b, 1982b) would seem to suggest a method
of reconciling the tension between universalist and relativist view-
points, in the form of a parametric approach to syntactic and semantic
variation within universal grammar. A preliminary attempt to apply
parametric methods to variation pertaining to quantification and
quantifier scope is made in Gil (1982a, b, to appear c).

In the quest for an integration of universalist and relativist approaches to the study of language, the following two methodological principles would appear useful to adopt:

(1) The Logical Variation Principle

Different logics may be posited for different idiolects, dialects, and languages.

In much of the recent literature in semantics—both linguistic and philosophical—it is tacitly assumed that a single logic underlies all human languages; often, e.g. in Montague's (1973) "Proper Treatment of Quantification in Ordinary English", the word "English" seems to be functioning as a surreptitious synonym for the phrase "any natural language". The Logical Variation Principle expressly denies this assumption, asserting that idiolects, dialects, and languages may exhibit variation in logical form, just as they quite obviously do in syntax, morphology, phonology, and phonetics. Although no explicit logical forms are proposed in this dissertation, the Logical Variation Principle will be invoked on a number of different occasions. For example, differential preferences of various syntactic domains of distributivity in constructions involving distributive numerals will be assumed to reflect idiolectal, dialectal, and cross-linguistic variation in logical forms. Or, elsewhere, it will be suggested that a number of cross-linguistic typological correlations pertaining to the syntax and semantics of quantification may be accounted for by assuming that languages may differ in the degrees to which they differentiate between categories of common and determined noun phrases.
While the Logical Variation Principle leads towards a relativist approach to language, the second methodological principle has the effect of constraining the degree of possible variation, thereby pointing in the direction of a more universalist outlook:

(2) The Unified Analysis Principle

Logics of different idiolects, dialects, and languages should be posited so as to differ minimally.

Given two otherwise equally meritorious analyses of a certain construction, the Unified Analysis Principle stipulates that the preferred analysis is that which is most consistent with analyses of corresponding constructions in other idiolects, dialects, and languages. This principle will be invoked frequently in the course of this dissertation. For example, the morphosyntactic and semantic similarity between two varieties of distributive numerals--e.g. Georgian sam-sami and sam-samat--will be invoked in order to support the existence of a logical affinity between their superficially dissimilar English translations three...each and in threes. Or, in another instance, the occurrence of conjoining expressions in Maricopa overtly marked for distributivity will be adduced in order to argue for a particular analysis of the interpretations of conjunctions such as doctors and lawyers in English. In many of these cases, the Unified Analysis Principle will provide insights into English that would have been hard to come by, if at all attainable, through an exclusive investigation of English.

The Logical Variation and Unified Analysis Principles will, hopefully, enable a balance to be struck between universalist and relativist approaches to the study of language. Both principles, however, assert
the necessity of investigating a wide variety of languages in order to facilitate the development of an empirically adequate logic for quantification in natural language.

1.3 Organizational Principles

The dissertation is organized as follows. Chapter 2 contains an introduction to the morphology, syntax, and semantics of distributive numerals. Chapter 3 and 4 provide discussion and analyses of the two major components of distributive numerals—numerals and distributivity respectively. Chapter 5 presents an analysis of distributive numerals, and some arguments in its support. Chapters 6, 7 and 8 contain detailed descriptions of distributive numerals and related constructions in three particular languages—Tagalog, Georgian and Maricopa respectively; further arguments are also brought from these languages in support of the analysis of distributive numerals developed in Chapter 5. Chapter 9 presents some universal generalizations regarding distributive numerals. Finally, Chapter 10 considers once again the necessity of basing any empirically adequate theory of natural language on a wide variety of structurally diverse languages.
Footnotes - Chapter 1

1 One reason for this is that I would like this dissertation to be readable—perhaps, even, of interest—five or ten years hence. Polemic is like pocket computers, or the sports pages of the daily newspaper: fun one day, obsolete the next. Since a dissertation is something one has to live with afterwards, I would like its value to be somewhat more than ephemeral.

A second, related, reason is that I personally find it rather difficult to take any kind of polemic seriously—my own included. I believe in a laissez faire approach to academia, whereby each person has the right to determine what he/she views as the most interesting questions to ask—and no right to denounce his/her colleagues' questions as uninteresting. With respect to linguistics, I believe, accordingly, that there exist a multitude of different ways of looking at language, no one of which is more legitimate than the other. Language may be viewed as a system of sound-meaning correspondences, a mental organ, a set of norms, a means of communication, a product of culture, a product of history, an aesthetic object, or whatever. I find it boorish when linguists of school X rebuke linguists of school Y, saying, reproachfully, "but how can you ignore semantics/context/communicative function/culture/processing constraints/diachrony/physiology/Chomsky (1984)?" I think one may choose to ignore whatever one wishes to.

Unfortunately, it is too easy to fall short of the ideal laissez faire approach—as, for example, in this very section, where I criticize current linguistic theories for ignoring the facts. Is there perhaps a qualitative difference between ignoring the "facts" and ignoring all the other items listed above—a difference that might justify my critique within a laissez faire philosophy? I fear not.

2 Thus, for example, in a passage translated and cited by Miller (1968:30), Humboldt (1903-1918 vol. 4:21-23) writes:

"To be sure, a midpoint around which all languages revolve, can be sought and really found, and this midpoint should always be kept in mind in the comparative study of languages, both in the grammar and lexicon. For in both there is a number of things which can be determined completely a priori, and which can be separated from the conditions of a particular language. On the other hand, there is a far greater number of concepts, and also grammatical peculiarities, which are so inextricably woven into the individuality of their language that they can neither be kept suspended between all languages on the mere thread of inner perception, nor can they be carried over into another language without alteration."

A succinct account of a philosopher's grappling with these problems is provided by Cassirer (1923:71), who, after acknowledging his debt to Humboldt, writes:
"this very wealth of empirical material creates an almost insuperable difficulty for philosophical inquiry. For it can neither disregard empirical particulars nor can it wholly submit to them and still remain entirely faithful to its own mission and purpose. In face of this methodological dilemma, the only possibility was to formulate the question asked of linguistics with systematic universality, but in each case to derive the answers from actual empirical inquiry. It was necessary to seek as broad as possible a view, and not only of one linguistic family, but of different families widely divergent in their logic and structure."

The present study of distributive numerals is conducted in the spirit of the above passage.

3 Reflecting the spirit of Humboldtian relativism, the Logical Variation Principle (or equivalents thereof) have been assumed, in varying degrees of explicitness, by philosophers such as Mauthner (1901-1902, 1904), Cassirer (1923, 1929), and Whorf (1956). More recently, Keenan (1975, 1976a,b) cites several instances of variation in the logical expressive power of natural languages, pertaining to constructions involving passive, relativization, negative coreference, etc. To the best of my knowledge, however, the first fully explicit formal semantics positing different logics for different languages is to be found in Stein's (1981) analysis of quantification in Thai. In Gil (1981a,b, to appear c) I assume the Logical Variation Principle in order to account for idiolectal, dialectal, and cross-linguistic variation in judgements pertaining to quantifier scope.

4 Unified analysis principles for dialectal variation in phonology and morphology have been proposed, among others, by Trager and Smith (1951), Weinreich (1954), Stockwell (1959), and Saporta (1965). A detailed exposition of an analogous approach to idiolectal variation in syntax and semantics is developed in a series of publications by Carden (1970, 1973, 1976). Cross-linguistic variation is, to the best of my knowledge, first explicitly subjected to a unified analysis approach by Keenan (1980). In Gil (1981a, to appear c) I attempt to formalize the Unified Analysis Principle, applying it uniformly to idiolectal, dialectal, and cross-linguistic variation in logical form.
Chapter 2

2. Distributive Numerals: A First Exploration

What are distributive numerals? Most or all Latin grammar-books, e.g. Bennett (1963), Gildersleeve and Lodge (1965), Greenough and Allen (1888), list--alongside cardinal, ordinal, multiplicative, and adverbial numerals--a series of distributive numerals, whose first members are singuli, bini, terni; these are generally glossed as, e.g. "three each", "in threes", "three by three", or "three at a time". However, most grammars of Latin cite, at best, a handful of sample constructions, from which the syntax and semantics of distributive numerals can only be guessed at.

In grammar-books of other languages, distributive numerals generally fare no better. In English, for example, a large majority of textbooks do not so much as acknowledge the existence of expressions such as in threes or three by three, corresponding to the Latin distributive numeral terni. And when mention is made of distributive numerals, it is often just a short paragraph citing a few forms--perhaps, also, a couple of sentences. Seldom is an adequate syntactic description provided; even more rarely an adequate semantics.

Moreover, what little discussion is made available on distributive numerals is all too often shrouded in terminological confusion. With regard to English, for example, Curme (1935:36-37) refers to expressions such as in threes and three by three as "numeral adjectives used as pronouns", while Poutsma (1916:1232) characterizes their use as being
"for want of distributive numerals" (emphasis added). Jespersen (1954 vol. 2:109), vol. 7:588-589) is nearly alone, it seems, in characterizing expressions such as these as bona fide "distributive phrases". Similar or worse terminological confusion crops up frequently in other languages. In Tagalog, for example, alongside ordinary numerals, e.g. tatlo "three", there are forms such as tigtatlo "three each" and tatlu-tatlo "in threes". But while tigtatlo is referred to as a "distributive numeral" by most sources, everybody seems to have a different term for tatlu-tatlo: Blake (1925:26) calls it a "distributive numeral", Lopez (1937:30) characterizes it as "distributive-collective", and Schachter and Otanes (1972:213-214) refer to it as a "grouping numeral".

Clearly, order of some kind must be imposed on this terminological chaos. However, a felicitous terminology presupposes a better understanding of the phenomenon to be named than is at present available. In the case at hand, the question immediately arises whether substantive semantic justification can be adduced for the characterization of expressions such as in threes, three by three, and their equivalents in other languages, as distributive numerals—as, for example, is suggested by Jespersen and Blake above, contra numerous other scholars.

A major goal of this dissertation is to provide an affirmative answer to the above question: expressions such as in threes and three by three will be argued to involve a relation of distributivity—albeit obtaining over a somewhat different domain than in constructions containing, say, the numeral three and an expression such as each. We shall accordingly speak of two major varieties of distributive numerals,
adnominal and adverbial—expressions such as in threes, three by three, and, also, Tagalog tatlu-tatlo, belonging to the latter category. (A third variety, distributive numerals qualifying verbs—glossed, e.g. as "three times each"—will be introduced in chapter 5.) The following two sections provide preliminary characterizations of adnominal and adverbial distributive numerals respectively.

2.1 Adnominal Distributive Numerals

Adnominal distributive numerals occur in the same environments as do ordinary numerals—that is, as modifiers of a nominal head. Not all languages have adnominal distributive numerals; in particular, English has none. The most felicitous translation into English of an adnominal distributive numeral often consists of a prenominal numeral expression plus a postnominal expression denoting distributivity, e.g. three ... each, ten ... apiece. Alternatively, adnominal distributive numerals may be translated into adverbial expressions, as, for example, in threes, three by three, three at a time. Following are examples of sentences containing adnominal distributive numerals in ten genetically areally, and typologically diverse languages. Each example is an approximate translation of the English sentence Two men carried three suitcases each. Each is obtained by first translating the somewhat simpler English sentence Two men carried three suitcases, and then applying to the numeral corresponding to English three a morphosyntactic marking denoting distributivity. Resulting are ten sentences in which the noun corresponding to English suitcases is modified by an adnominal distributive numeral corresponding roughly to the discontinuous English expression three ... each.²
(1) a. Tagalog (Philippine, Austronesian, Austro-Tai)
    Dinala ng dalawang lalaki ang tiglatlong maleta
carried-PT dir two-lig man top dist-three-lig suitcase

b. Hindi (Indo-Aryan, Indo-European)
    Do ādmi tīn-tīn sūṭ-kēś le gaye hēi
two man-dir three-dist suitcase-dir take gone-plm be-pres-3pl

c. Georgian (South Caucasian)
    Orma k'acma sam-sami  ᵏcantₐ c'airo
two-erg man-erg three-dist-nom suitcase-nom carried-3sg

d. Turkish (Turkic, Altaic)
    Iki adam üçer bavul taşidi
two man three-dist suitcase carried

e. Russian (Slavic, Indo-European)
    Dva veslova nosili po tri čemodana
two-dir man-gen:sg carried-pl dist three-dir suitcase-gen:sg

f. Rumanian (Romance, Indo-European)
    Doi oameni au cărat cîte trei valize
two men have-3pl carried dist three suitcases

g. Nubian (Eastern Sudanic, Nilo-Saharan)
    Ogič owwi šamta toski-toski kagra
man two suitcase three-dist carry-pl:obj

h. Bura (Chadic, Afroasiatic)
    Mji sudâ kôtè pântëmotâ màamâkèr
men two took suitcase dist-three

i. Ga (Kwa, Niger-Congo, Niger-Kordofanian)
    Nîî enyê tele adekai etëřê
mèn two carried suitcases three-dist
j. **Maricopa** (Yuman, Hokan)

\[
\begin{align*}
?\text{iop}_g & \quad \text{xvikk} & \quad ?\text{ii} & \quad \text{xmokxperm} & \quad \text{paay}_g^\text{ik} \\
\text{men-nom} & \quad \text{3-two-sg-ss} & \quad \text{stick} & \quad \text{3-three-sg-dist-ds} & \quad \text{3-carried-dual-real}
\end{align*}
\]

The superficial similarity between the above sentences culled from diverse languages lends prima facie support to the claim that adnominal distributive numerals constitute a coherent well-defined syntactic-semantic construction type. Nevertheless, English and many other languages do not possess adnominal distributive numerals, employing instead alternative morphosyntactic devices to express the same range of meanings. Moreover, most, perhaps all languages possessing adnominal distributive numerals, also exhibit alternative strategies for the construction of more or less accurate paraphrases for the sentences in (1). Some of the available alternative constructions for adnominal distributive numerals are exemplified below.

(2) a. **English** (Germanic, Indo-European)

Two men carried three suitcases each

b. **Buginese** (South Sulawesi, Austronesian, Austro-Tai)

Dua tau mabicang tellu beg ta?sedisedina
two men carry three suitcase dist-one-posse

c. **Batak** (West Indonesian, Austronesian, Austro-Tai)

Marsiboan tas na tolu be dua ama-ama
dist-carried suitcase link three dist two man

d. **Persian** (Indo-Aryan, Indo-European)

Do nafar har yek se jāmedān burmand
two man every one three suitcase carried-3pl
e. Hebrew (Semitic, Afroasiatic)
   Sney anašim nasʔu šaloiš mizvadot kol eḥad
two-m people carried-3pl three-f suitcases every one-m

f. Georgian (South Caucasian)
   Orma k'acma sami ćanta c'aiyo titom
two-erg man-erg three-nom suitcase-nom carried-3sg each-erg

g. Russian (Slavic, Indo-European)
   Dva čeloveka nosili tri čemodana každi
   two-dir man-gen:sg carried-pl three-dir suitcase-gen:sg each-dir

h. Rumanian (Romance, Indo-European)
   Doi oameni au cărat trei valize fiecare
two men have-3pl carried three suitcases each

i. Bura (Chadic, Afroasiatic)
   NgModule kowani dê kwâ da kêtà pantimotà màakàr
   people two every from in them took suitcase three

j. Maricopa (Yuman, Hokan)
   ?Ipač xvikk ?ii xmom ñaayxpërsik
   men-nom 3-two-sg-ss stick 3-three-sg-ds 3-carried-dist-dual-real

While sentences (2a-e) in English, Buginese, Batak, Persian, and Hebrew are from languages not possessing adnominal distributive numerals, sentences (2f-j) in Georgian, Russian, Rumanian, Bura, and Maricopa are optional alternatives to sentences (1c,e,f,h,j) with adnominal distributive numerals in the same languages. Nevertheless, both groups of languages appear to exhibit a similar range of morphosyntactic strategies: most commonly a numeral plus an adverbal phrase, e.g. English, Georgian; less frequently a numeral plus a verbal affix, e.g. Batak, Maricopa. ³
2.2 Adverbial Distributive Numerals

In contradistinction to their adnominal counterparts, adverbial distributive numerals appear to be common to all languages, e.g. English in threes, three by three. Following are examples of sentences containing adverbial distributive numerals, again from several genetically, areally, and typologically diverse languages. The sentences below are similar to those in (1), except that the distributive numeral is adverbial, rather than adnominal; each sentence is an approximate translation of the first, namely, English sentence (3a).

(3) a. English (Germanic, Indo-European)

Two men carried the suitcase three by three

b. Japanese (Altaic)

Putari no hito ga kaban o mittsu zutsu hakonda
two-cl of man nom suitcase acc three-cl dist carried

c. Mandarin Chinese (Sino-Tibetan)

Liāng ge nánrén tái xiāngzi sān ge sān ge di tái
two cl man carry suitcase three cl three cl adv carry

d. Swedish (Germanic, Indo-European)

Två män bar. väskorna tre och tre
two men carried suitcases-.def three and three

e. Hebrew (Semitic, Afroasiatic)

Sney anašim nas?u et hamizvadot šalos šalos
two-m people carried-3pl acc the-suitcases three-f-dist

f. Tagalog (Philippine, Austronesian, Austro-Tai)

Dinala ng dalawang lalaki nang tatlu-tatlo ang mga maleta
carried-PT dir two-lig man adv dist-three top pl suitcase
g. **Georgian** (South Caucasian)

Orma `k'acma ьcantebi c'aiyo sam-samat

two-erg man-erg suitcases-nom carried-3sg three-dist-adv

h. **Turkish** (Turkic, Altaic)

Iki adam bavulları üçer üçer taşdı

two man suitcases-acc:def three-dist carried

i. **Russian** (Slavic, Indo-European)

Dva человека носил чедоманы po troje

two-dir man-gen:sg carried-pl suitcase-dir:pl dist three-coll-dir

j. **Romanian** (Romance, Indo-European)

Doi oameni au ьcarat valize ьcite trei

two men have-3pl carried suitcases dist three

As with their adnominal counterparts, adverbial distributive numerals may alternate with constructions of a different kind; in the case at hand, these typically involve a prepositional phrase, such as English *in groups of three*, or a complex NP, such as English *three at a time.*

2.3 **Some Preliminary Generalizations**

The sentences in (1), (2), and (3) exhibit varying degrees of similarity to one another. While English (2a) and (3a) differ both syntactically and semantically in quite obvious ways, the corresponding constructions with adnominal and adverbial distributive numerals resemble each other more closely. For example, Georgian (1c) and (3g) differ only in the linear position of the distributive numeral and its case marking. Moreover, as will be seen shortly, constructions with adnominal distributive numerals, as in (1), are semantically closer to constructions with
adverbial distributive numerals, as in (3), than are the constructions in (2). In fact, in the Bura and Gã sentences (1h,i), the adnominal distributive numerals are, arguably, alternatively analyzable as adverbial—thereby rendering these sentences syntactically (though not necessarily semantically) ambiguous.

In face of the syntactic and semantic differences between the English expressions three ... each and in threes, the similarity exhibited by adnominal and adverbial distributive numerals and the constructions involving them in other languages may seem rather surprising. From a universally oriented vantage point, however, this similarity provides prima facie support for the treatment of adnominal and adverbial distributive numerals as two syntactically conditioned variants of a single construction type in universal grammar. One of the major goals of this dissertation is to develop a unified analysis of adnominal and adverbial distributive numerals along these lines; this will be done in chapter 5. Meanwhile, in the remainder of this chapter, we shall conduct a preliminary exploration of the morphological, syntactic, and semantic properties of adnominal and adverbial distributive numerals, noting in more detail the differences and similarities between both varieties.

2.3.1 Morphology

Distributive numerals are almost always morphosyntactic functions of the corresponding ordinary numerals, e.g. English adverbial distributive numerals in threes and three by three, formed from ordinary numeral three. Some generalizations governing the nature of these functions are suggested in chapter 9. Languages may be classified in accordance with the forms of their distributive numerals and their interrelationships;
this classification is represented with representative samples in table 1.

Table 1

<table>
<thead>
<tr>
<th>Language Type</th>
<th>Language</th>
<th>Ordinary Numerals</th>
<th>Adnominal Distributive Numerals</th>
<th>Adverbal Distributive Numerals</th>
<th>Gloss of Ordinary Numeral</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) No adnominal distributive numerals</td>
<td>English</td>
<td>three</td>
<td>--</td>
<td>three by three</td>
<td></td>
</tr>
<tr>
<td>Hebrew</td>
<td>šloşa</td>
<td>--</td>
<td>šloşa šloşa</td>
<td>three</td>
<td></td>
</tr>
<tr>
<td>Burushaski</td>
<td>hin</td>
<td>--</td>
<td>hin hin</td>
<td>one</td>
<td></td>
</tr>
<tr>
<td>Indonesian</td>
<td>tiga</td>
<td>--</td>
<td>bertigatiga</td>
<td>three</td>
<td></td>
</tr>
<tr>
<td>(B) Adnominal and adverbial distributive numerals unrelated</td>
<td>Tagalog</td>
<td>tatlo</td>
<td>tigtatlo</td>
<td>tatlu-tatlo</td>
<td>three</td>
</tr>
<tr>
<td>(C) Adnominal and adverbial distributive numerals identical</td>
<td>Latin</td>
<td>tres</td>
<td>terni</td>
<td>terni</td>
<td>three</td>
</tr>
<tr>
<td>Pangasinan</td>
<td>talo</td>
<td>santatatlo</td>
<td>santatatlo</td>
<td>three</td>
<td></td>
</tr>
<tr>
<td>Hausa</td>
<td>biyú</td>
<td>biyú biyú</td>
<td>biyú biyú</td>
<td>two</td>
<td></td>
</tr>
<tr>
<td>Yoruba</td>
<td>mérin</td>
<td>mérinmérin</td>
<td>mérinmérin</td>
<td>four</td>
<td></td>
</tr>
<tr>
<td>(D) Adnominal and adverbial numerals derived from distributive numeral stem</td>
<td>Georgian</td>
<td>sami</td>
<td>sam-sami</td>
<td>sam-samat</td>
<td>three</td>
</tr>
<tr>
<td>Bikol</td>
<td>saro</td>
<td>tigsarosaro</td>
<td>sarosaroon</td>
<td>one</td>
<td></td>
</tr>
<tr>
<td>Language Type</td>
<td>Language</td>
<td>Ordinary Numerals</td>
<td>Adnominal Distributive Numerals</td>
<td>Adverbial Distributive Numerals</td>
<td>Gloss of Ordinary Numeral</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------</td>
<td>-------------------</td>
<td>---------------------------------</td>
<td>-------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>(E) Adverbial distributive numeral derived from adnominal distributive numeral</td>
<td>Cebuano</td>
<td>upat</td>
<td>tagupat</td>
<td>tinagupat</td>
<td>four</td>
</tr>
<tr>
<td></td>
<td>Mundari</td>
<td>upunia</td>
<td>upupunia</td>
<td>upupuniate</td>
<td>four</td>
</tr>
<tr>
<td></td>
<td>Turkish</td>
<td>üç</td>
<td>üçer</td>
<td>üçer üçer</td>
<td>three</td>
</tr>
<tr>
<td></td>
<td>Fox</td>
<td>neswį</td>
<td>naneswį</td>
<td>naneswicį</td>
<td>three</td>
</tr>
</tbody>
</table>

Type A languages are those without adnominal distributive numerals. Type B languages have both adnominal and adverbial distributive numerals, but both types are independently derived from the corresponding ordinary numerals. For example, in Tagalog, adnominal distributive numeral tigtatlo is derived from tatlo by prefixation of tig-, while adverbial distributive numeral tatlu-tatlo is derived from tatlo by an unrelated process of reduplication. This type of language is relatively uncommon. Type C languages are those in which adnominal and adverbial distributive numerals are of identical form; this type of language is very widespread. In type D languages, adnominal and adverbial distributive numerals are derived from a common distributive stem, which in turn is derived from a corresponding ordinary numeral stem. For example, Georgian numeral stem sam- forms the basis for the reduplicated distributive numeral stem sam-sam-, which (like ordinary sam-) may receive a variety of case marking suffixes—among which are nominative -i, yielding adnominal distributive numeral sam-sami, and adverbial -at, yielding adverbial distributive numeral sam-samat. In type E languages, adverbial distributive numerals are derived from adnominal distributive numerals, which in turn are derived from ordinary numerals. For example, Cebuano adverbial...
distributive numeral *tinagupat* is derived by infixation of -in- from
adnominal distributive numeral *tagupat*, which in turn is derived by
prefixation of *tag-* to ordinary numeral *upat*. Some languages may belong,
by dint of variable distributive numeral forms, to more than one of the
above five types. In Rumanian, for example, ordinary numeral *trei*
"three" may be preceded by *înte* to yield adnominal or adverbial distrib-
utive numeral *între*--as in type C. However, adverbial distributive
numerals in Rumanian possess alternative forms resulting from either
partial or total reduplication of the adnominal distributive numeral
form: *trei înte trei* or *înte trei înte trei*--as in type E.

The data in table 1 exhibit interesting non-random patterns. As
was noted previously, many languages have only adverbial distributive
numerals (type A), while no languages, it would seem, have only adnomi-
al distributive numerals. However, in spite of the wider distribution
of adverbial distributive numerals across the world's languages, these
forms emerge as more morphosyntactically complex than their adnominal
counterparts. Thus, while many languages derive adverbial distributive
numerals from adnominal ones (type E), no languages, apparently, derive
adnominal distributive numerals from adverbial ones. Of particular
interest is the fact that among those languages with both adnominal and
adverbial distributive numerals, an overwhelming majority (types C, D,
and E, to the exclusion of B) exhibit similar or identical forms for
both types of distributive numerals. Morphologically, at least, adnomi-
al and adverbial distributive numerals are two breeds of the same
species. In the continuation, it will be argued that in the case at
hand, morphology is a faithful reflection of logic; indeed, it is

22

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
languages such as English or Tagalog in which the morphology obfuscates
the underlying logical similarity between adnominal and adverbial
distributive numerals.

2.3.2 Syntax

Adnominal distributive numerals generally occur in the same syn-
tactic environments as their ordinary numeral counterparts--i.e. in con-
struction with a nominal head. The nature of this construction, however,
may vary considerably from language to language. Ordinary numerals do
not constitute a coherent cross-linguistically uniform syntactic cate-
gory; rather, in different languages (and often within the same language)
they are subsumed under a variety of larger syntactic categories, e.g.
determiner, noun, adjective, verb. The same is true, ipso facto, for
adnominal distributive numerals. Thus, as will be argued in the con-
tinuation, Tagalog tigtatlong "dist-three-link" in (1a) shares many
properties with other nouns, Georgian sam-sami "three-dist-nom" in (1c)
behaves much like an adjective, while Maricopa xmokxperm "three-dist-ds"
in (1j) is for all intents and purposes a verb. In fact, the one major
syntactic category to which adnominal distributive numerals never seem
to belong is, rather surprisingly, that of determiner: evidence will be
adduced in chapter 9 showing that languages with adnominal distributive
numerals fail to distinguish between common and determined noun phrases;
as a result, such languages cannot possess a syntactic category combin-
ing with common noun phrases to yield determined noun phrases.

Adnominal distributive numerals thus do not constitute a cross-
linguistically uniform category. It is not surprising, therefore, to
find that the morphological processes employed to form distributive

23
numerals from ordinary ones may also be used to form distributive expressions in the larger categories to which numerals belong. Thus, for example, in Georgian, reduplication is used to form a variety of distributive adjectives, e.g. ćkar-ćkari "fast-dist-nom" from ćkari "fast-nom", while in Maricopa, -xper may be suffixed to any verb to form its distributive counterpart, as in (2j) paayxpersík "3-carried-dist-dual-real".

Similarly, adverbial distributive numerals do not constitute a coherent syntactic category, but, rather, are subsumed within the larger category of adverb—which in itself is not a cross-linguistically uniform category. As is the case for adnominal distributive numerals, the morphological process signifying distributivity may accordingly be used to derive a variety of distributive adverbial expressions—for example, Georgian ćkar-ćkara "fast-dist-adv" from ćkara "fast-adv". Contrary to their adnominal counterparts, however, adverbial distributive numerals are not generally formed from non-distributive numerals of the same category: in most languages, ordinary numerals do not occur as adverbs.

Distributive numerals thus do not represent a unified syntactic phenomenon. Rather, like other construction types, e.g. passives, causatives, reflexives, etc., they reflect clusterings of syntactic and semantic properties, the nature of which may vary from language to language. We shall now consider briefly some of the semantic properties that go hand in hand with the aforementioned syntactic properties.

2.3.3 Semantics

An introductory view of the semantics of distributive numerals may be obtained through an examination of the interpretations of sentences
(1) and (3)—and, for sake of contrast, (2)—with respect to the following five parameters: (i) number of men involved; (ii) whether the men acted individually or collectively; (iii) number of events involved; (iv) number of suitcases involved; and (v) whether the suitcases were acted upon individually or collectively.

Speakers judging sentences (1) – (3) generally assign them one or more of the following three classes of interpretations, defined in terms of the following five parameters:\textsuperscript{5}

(4) Classes of interpretations of sentences (1) – (3)

a. \textbf{Class A}

(i) two men;

(ii) men acted individually;

(iii) one or many events;

(iv) two sets of three suitcases, one for each man;

(v) suitcases acted upon individually or collectively;

b. \textbf{Class B}

(i) two men;

(ii) men acted individually or collectively;

(iii) many events;

(iv) at least two sets of three suitcases, one for each event; sets either disjoint or not necessarily so;

(v) suitcases acted upon preferably collectively;

c. \textbf{Class C}

(i) two men;

(ii) men acted individually or collectively;

25
(iii) one or many events;
(iv) at least two sets of three suitcases;
sets preferably disjoint;
(v) suitcases acted upon preferably collectively.

Each class of interpretations contains an infinite number of individual interpretations, some of which are preferred over others. For example, class C contains interpretations in which the sets of suitcases number two, three, four, etc. Among the interpretations with, say, four sets of suitcases, those in which the sets are disjoint (i.e. there are exactly twelve suitcases) are preferred over those in which the sets of suitcases intersect (i.e. there are between three and twelve suitcases). Note that the three classes of interpretations are not logically independent; for example, an interpretation involving two men acting individually, many events, and two disjoint sets of three suitcases acted upon collectively, may belong to all three classes. The above three classes of interpretations may be roughly paraphrased in terms of the following English sentences:

(5) a. **Class A**
Two men carried three suitcases each  (= (2a))

b. **Class B**
Two men carried the suitcases three at a time

c. **Class C**
Two men carried sets of three suitcases

In general, sentences with adnominal distributive numerals, e.g. (1), are assigned classes A, B, and/or C of interpretations, whereas
sentences with adverbial distributive numerals, e.g. (3), are assigned classes B and/or C of interpretations. Sentences with ordinary numerals plus verbal or adverbial markers of distributivity, e.g. (2), generally receive class A of interpretations alone. Speakers of English may appreciate these facts by contrasting sentence (2a), exhibiting class A of interpretations, only, with sentence (3a), exhibiting classes B and C of interpretations.

Note that the three classes of interpretations are defined in terms of five apparently independent semantic parameters. The question immediately arises why values of these five parameters should cluster in precisely the three ways indicated in (4), and not in a variety of other logically possible ways. (Why not, for example, have a class D of interpretations where there are two men who acted individually—as in A; where there are many events—as in B; and where there are at least two preferably disjoint sets of three suitcases acted upon preferably collectively—as in C?)

As a first step towards answering this question, it may be observed that the particular values of the five parameters in class A of interpretations are what would be predicted by assuming that 3-DIST SUITCASES distributes over 2 MEN. The problem then remains how to account for the existence of classes B and C of interpretations, where no relation of distributivity appears to obtain. Let us consider, for example, sentence (1d) in Turkish, with adnominal distributive numeral üçer. Sentence (1d) may have classes A, B, and C of interpretations. Should we conclude, then, that Turkish has three logically distinct but homophonous forms üçer: one, an adnominal distributive numeral "three
each", another, meaning "three at a time", and a third, glossed as "sets of three"?

It should be obvious, however, that such a characterization of distributive numerals leaves much to be desired. In chapter 5, an alternative solution to this problem is proposed. For class A interpretations, a constituent containing the distributive numeral distributes, as expected, over another NP in the clause: in the above examples, 3-DIST SUITCASES distributes over 2 MEN. For class B interpretations, however, the same constituent is argued to distribute over a verbal phrase, or, more precisely, over a usually covert component of the verbal phrase denoting a set of units, events, or "times": in the above examples, 3-DIST SUITCASES distributes over SEVERAL UNITS, contained in the verbal phrase SEVERAL UNITS CARRIED. Finally, for class C interpretations, the distributive numeral is argued to distribute phrase-internally over a covert or overt classifier constituent denoting a set of units into which the head of the numeral phrase is partitioned: in the above examples, 3-DIST distributes over UNITS, within the NP 3-DIST UNITS SUITCASE.

Thus, a wide range of interpretations of constructions involving distributive numerals is argued to result from the relation of distributivity obtaining over a variety of domains, between phrasal and clausal constituents. This analysis accordingly provides vindication for our characterization--following Jespersen, Blake, and other scholars--of adnominal and adverbial distributive numerals as two varieties of a single construction type.
2.4 The Composite Nature of Distributive Numerals

In both form and meaning, then, distributive numerals are composite objects, consisting of a numeral with a numeral meaning, plus a morphological marking denoting a relation of distributivity. In order to be in a more suitable position to study distributive numerals, it is thus first necessary to be equipped with an adequate understanding of each of their two component parts, as independent entities. The next two chapters of this dissertation are accordingly devoted to a survey of the syntax and semantics of numerals and distributivity respectively.
Footnotes - Chapter 2

1 For example, a random search of the appropriate library shelves turned up ten grammar-books not mentioning constructions such as in threes or three by three; these were Bryant (1959), Cattell (1969), Curme (1947), Krulingsa (1911), Langendoen (1970), Long (1961), Pence and Emery (1947), Quirk, Greenbaum, Leech and Svartvik (1972), Schibbye (1965) and Strang (1962). Three grammar-books did mention these constructions; these are discussed below.

In contrast, grammar-books written in the Soviet Union frequently feature a small subsection titled Razdelitel'nye Čisitel'nye "distributive numerals". It is tempting to speculate that their keen interest in distributive numerals is a result of the greater productivity of distributive numerals in Russian as opposed to English.

2 Unless explicitly stated otherwise, all the data cited in this dissertation were elicited from native speakers, or from persons sufficiently well acquainted with the language in question. See the preface for a detailed list of sources.

3 Of course, most or all languages have a number of additional ways of expressing the range of meanings exhibited by the sentences in (1) and (2). For example, a universal quantifier may occur in a genitival construction within the agent NP, rather than within the patient NP as in (2a), e.g. English Each of two men carried three suitcases. More awkwardly, perhaps, a sentential conjunction can be used, e.g. One man carried three suitcases, and another man carried three suitcases. Finally, it should be noted that the range of interpretations of sentence (2a), as well as that of the above sentences, is--for some if not all speakers--properly included in the range of interpretations of the simpler sentence Two men carried three suitcases--see Gil (to appear b) for detailed discussion of this point.

4 Data in table 1 are from the following sources. Burushaski: Klimov and Edelman (1970:47); Pangasinan: Blake (1907:238-239); Yoruba: Ogunbawale (1907:115-116); Bikol: Blake (1907:238-239); Cebuano: Lopez (1949:126); Mundari: Hoffman (1903:66); Fox: Jones (1911:863-865).

5 For ease of exposition, we shall henceforth assume--unless explicitly stated otherwise--that all numerals are interpreted as neither increasing nor decreasing, e.g. that three is synonymous with exactly three. Some logicians may take issue with this assumption: it is often claimed, e.g. Barwise and Cooper (1981), that the simple numerals are increasing, for example, that three is synonymous with at least three. Thus, it is claimed that the sentence Two men carried three suitcases will be true (if perhaps pragmatically inappropriate) in a state of affairs where two men carried exactly seventy-three suitcases.
No attempt is made to defend the present assumption in this dissertation, and nothing crucial hinges on it. It is worth noting, however, that non-logician speakers of English are often very difficult to convince that natural language numerals may be interpreted as increasing. In work in progress, I am attempting to account for this fact by positing for the numerals logical forms consisting of an (increasing) existential quantifier ranging over sets whose cardinality is specified exactly: thus, three would be represented, roughly as \( \exists X \) such that \( |X| = 3 \), while at least three would be represented as \( \exists X \) such that \( |X| \geq 3 \). This will not be pursued any further here.

6 Henceforth, capital letters are used for expressions in a sort of formalized English, which, in this dissertation, is the closest we shall come to providing explicit logical forms. Thus, for example, 3-DIST SUITCASES may be viewed as a semantic representation for, say, Tagalog tigtatlong maleta—cf. (la), or Georgian sam-sam σanta—cf. (1c). For ease of exposition, however, we shall occasionally mix levels of representation, saying, alternatively, that 3-DIST SUITCASES distributes over 2-MEN, or, somewhat less accurately, that tigtatlong maleta distributes over dalawang lalaki.

7 In what follows, we use the term "verbal phrase" to characterize any constituent whose major component is a verb, either transitive or intransitive, e.g. carried, sang twice—in contradistinction to the abbreviation "VP", which is used in its usual capacity to denote the syntactic category that combines with NPs to yield sentences.
Chapter 3

3. The Syntax and Semantics of Numerals

We shall distinguish between absolute numeral series—i.e. numeral series whose distinguishing features are primarily or exclusively semantic, e.g. restrictives, ordinals, distributives, and contextual numeral series—namely, numeral series defined in terms of syntactic and semantic properties, e.g. adverbial numerals, numerals qualifying verbs.

3.1 Absolute Numeral Series

Some languages, e.g. Chuvash (Greenberg 1978:287), distinguish between numeral forms used for counting, and numeral forms occurring within larger constructions. However, most languages do not make this distinction; moreover, for both types of languages, the morphologically least marked type of numeral is, in any case, the adnominal, i.e. that which occurs in construction with a noun (Greenberg 1978:286). In this section, we shall accordingly survey the syntax and semantics of the various absolute numeral series which occur in construction with nouns.

3.1.1 Cardinal Numerals

The cardinal numeral series is the most basic series morpho-syntactically, in perhaps every natural language. In their seminal study of the semantics of determiners (expressions that combine with common noun phrases to yield determined noun phrases), Keenan and Stavi (to appear) note that the logical type for the determiners forms a boolean algebra generated by the set of increasing determiners; they then observe that (with one or two exceptions) the set of increasing determiners...
properly contains the set of morphosyntactically primitive determiner expressions in English—among which, of course, are the first ten or twelve numerals. In section 3.2, we shall argue that numerals frequently belong to syntactic categories other than determiner; nevertheless, Keenan and Stavi provide an interesting algebraic explanation for the morphosyntactic basicness of the cardinal numerals. For these numerals, a plethora of studies is available—e.g. Corstius (1968), Greenberg (1978), Hurford (1975), Menninger (1969), Stampe (1977), Swadesh (1972: 183-191); their results need not be surveyed here.

3.1.2 Non-Cardinal Adnominal Numerals

Alongside the cardinal numerals, however, languages may possess a variety of other adnominal numeral series; as a rule, these are formed by morphosyntactic modifications of their cardinal numeral counterparts. As opposed to the cardinal numerals, these other series have been scantily, if at all, studied. Since, as we shall see in subsequent chapters, these numeral series occasionally form the basis for alternative series of distributive numerals, we shall find it worthwhile to survey these other numeral series briefly below.

To begin, most or all languages have alternative series of numerals varying in their values of the features increasing and decreasing. Although the cardinal numerals are characterized by most logically-minded linguists, e.g. Barwise and Cooper (1981), as increasing and non-decreasing (cf. footnote 5, chapter 2), languages generally have available a strategy for making their increasing nature more overt—as in the following synonymous examples from English and Hebrew:

33
(1) a. **English**
   
   two $\rightarrow$ at least two

b. **Hebrew**
   
   šney $\rightarrow$ lefaḥot šney

Next, there is a series of non-increasing decreasing numerals, for example:

(2) a. **English**
   
   two $\rightarrow$ at most two

b. **Hebrew**
   
   šney $\rightarrow$ lekol hayoter šney

Thirdly, there is a series of non-increasing non-decreasing numerals:

(3) a. **English**
   
   two $\rightarrow$ exactly two

b. **Hebrew**
   
   šney $\rightarrow$ bidyuk šney

Of particular interest is a variety of non-increasing non-decreasing numerals exhibiting a negative affective value not shared by those in (3)--these are often referred to as **restrictive** numerals:

(4) a. **English**
   
   two $\rightarrow$ only two

b. **Hebrew**
   
   šney $\rightarrow$ rak šney

Typically, restrictive numerals display multiple ambiguities resulting from the variable scope of the operator only; a full analysis of their
semantics is beyond the scope of this dissertation. Interestingly, many languages use morphological, rather than syntactic devices, to form restrictive numerals; thus, in Cebuano, Mongolian, and Paipai, restrictive numerals are formed by suffixation from the corresponding cardinal numeral, while in Turkish, restrictive numerals may be formed by applying a suffix to the numeral classifier tane (all of the examples below mean "only two").

(5) a. **Cebuano** (Lopez 1949:125)
   duha --------- > duhada

b. **Mongolian** (Poppe 1964:56)
   qoyar --------- > qoyargan

c. **Paipai** (Langdon and Munro 1980:124)
   xgwak --------- > xgwaks

d. **Turkish**
   iki tane --------- > iki tanecik

Semantically akin to the non-increasing non-decreasing numerals are a series of **approximative** numerals:

(6) a. **English**
   eight --------- > about eight

b. **French**
   huit --------- > une huitaine

c. **Hebrew**
   šmona --------- > kišona

A somewhat different numeral series is often termed **multiplicative**.
(7) a. **English**
   
   three → triple

b. **Hebrew**
   
   שָלוֹא → mešulaš

Perhaps the most well known alternative numeral series is the **ordinal**:

(8) a. **English**
   
   three → third

b. **Hebrew**
   
   שָלוֹא → sliši

Often formally related to the ordinals is a series of **fractional** numerals:

(9) a. **English**
   
   three → a third

b. **Hebrew**
   
   שָלוֹא → šlis

Another, somewhat heterogeneous series of numerals is occasionally termed **collective**; the examples below are glossed, alternatively, as "all five", "a five-tuple", or "a fivesome":

(10) a. **Mongolian**  
   
   tabun → tabuŋula

b. **Bulgarian**  
   
   pet → petima

c. **Hebrew**
   
   ḫamiša → ḫamisinya
The above series, and possibly others, are each worthy of a full-scale syntactic and semantic study; this is, of course, beyond the scope of the present dissertation, which deals with one particular numeral series, namely, distributive numerals.

Of interest here, however, is the fact that various absolute numeral series can be combined. In Pangasinan, for example, ordinal numerals are formed by prefixation, and restrictive numerals by initial reduplication. However, Pangasinan also has a series of restrictive ordinal numerals, formed by initial reduplication from the prefixed ordinal numeral. The following example indicates how these three series are formed from the cardinal numeral *dua* "two", the restrictive ordinal numeral *kadkadua* being glossed by Blake (1907:251) as "the one that alone makes the second of a series":

![Diagram](image)

In the continuation, we shall see that the distributive numeral series may also be combined with other non-cardinal absolute series. Thus, for example, Tagalog will be found to possess, in addition to ordinary distributive numerals, e.g. *tigtatlo* "three each" and *tatlu-tatlo* "in threes", also distributive restrictive numerals, e.g. *titigatlo* "only three each", and distributive ordinal numerals, e.g. *ikaikatlo* "every third".

37
3.2 Contextual Numeral Series

So far in this chapter, we have considered only the properties of
denominial numerals, that is, numerals in construction with a head noun
and semantically qualifying the same noun. Adnominal numerals, however,
may belong to a wide variety of syntactic categories, e.g. determiner,
adjective, noun, verb; moreover, numerals qualifying nouns may be not
only adnominal but, also, adverbial, or part of a verbal phrase in
construction with the qualified noun. Furthermore, numerals may qualify
not only nouns, but, also, expressions belonging to other categories,
e.g. verb, adjective. In the remainder of this chapter, we shall survey
the syntactic and semantic behaviour of numerals within larger
constructions.

3.2.1 Adnominal Numerals

In most current work in formal semantics, e.g. Barwise and Cooper
(1981), Keenan and Stavi (to appear), it is tacitly or explicitly as-
sumed that cardinal numerals and related expressions (e.g. several,
many, all) all belong to a single syntactic category of determiner,
combining with common noun phrases (or Ns) to yield determined noun
phrases (or Ns). This assumption, however, is at variance with a large
weight of linguistic evidence. In different languages, numerals may
belong to different categories; moreover, different numerals may belong
to different categories within the same language. Consider, for example,
the following adnominal numeral constructions in Hebrew:

(12) a. Yeled ehad
    boy one-m
    "One boy"
b. Šloša yeladim
   three-m boys
   "Three boys"

c. Meʔa yeladim
   hundred boys
   "A hundred boys"

d. Revavat yeladim
ten:thousand-of-f boys
   "Ten thousand boys"

The numeral ehad "one" in (12a) is purely adjectival: like other Hebrew adjectives, it occurs postnominally, and agrees with its head noun in gender, definiteness (cf. hayeled haḥad "the-boy the-one-m" / hayeled hagadol "the-boy the-big-m"), and number (cf. yeladim aḥadim "boys one-plm" i.e. "several boys" / yeladim gdolim "boys big-plm"). Conversely, the numeral revava "ten thousand" in (12d) is purely nominal: it occurs in a prenominal genitival construction with a construct case suffix -t reflecting the intrinsic feminine gender of revava—and, like other nouns in genitival constructions, it may in turn be modified, e.g. revava rafašanit šel yeladim "ten:thousand noisy-sgf of boys" i.e. "a noisy ten thousand boys". In between ehad and revava, the numerals šloša "three" and meʔa "hundred" exhibit some adjectival properties and some nominal properties; they, perhaps, may be assigned to an "intermediate" syntactic category of determiner.

Hebrew adnominal numerals thus belong to at least two different syntactic categories. The Hebrew facts are actually typical of a language-universal tendency for small numerals to be adjectival and large ones to be nominal; this tendency has been commented upon, among others, by Stampe (1977:598-599), Hurford (1975:51) (for powers of ten), and

39
Greenberg (1978:285-286), who formulates it as his "Universal 47", citing examples from Berber (Moroccan), Coptic, Rumanian, Welsh, Lithuanian, and Russian. However, factors other than the size of the numeral may also affect its syntactic category. In Hebrew, for example, the syntactic category of numerals such as *šloša* "three" is also governed by definiteness. When indefinite, as shown by the previous example, they exhibit at least some adjectival properties, e.g. gender agreement—but when definite, they enter into a genitival construction similar to that exhibited by *revava* "ten thousand" in (12d):

(13) a. $\check{\ddot{s}}loša$ yeladim
    three-m boys
    "Three boys"

    b. $\check{\ddot{s}}lošet$ hayeladim
    three-of-f the-boys
    "The three boys"

In Russian, the syntactic category of adnominal numerals is also governed by case; thus, adnominal numerals in direct cases enter into genitival constructions, while adnominal numerals in oblique cases enter into adjectival constructions:

(14) a. *Tr* studenta
    three-nom student-gen-sg

    b. *Trjom* studentam
    three-dat student-dat:pl
    "Three students (nom/dat)"

Numerals may also exhibit significant cross-linguistic variation with respect to syntactic categories. In Maricopa, for example, numerals are fully-fledged verbs, taking the gamut of verbal inflections. The following adnominal numeral construction is thus also a full sentence:

40
(15) Mxaan'ís xmokk
    boys-dem-nom 3-three-sg-real
    "The boys number three"

Consequently, as argued in chapter 8, a sentence such as Three boys sang is rendered by a complex sentence in Maricopa.

Adnominal numerals are thus syntactically heterogeneous, belonging to a variety of categories, within and across languages. The same is true, albeit with some variation, with respect to various other absolute numeral series. Thus, for example, multiplicative numerals are often verbal (e.g. Hebrew), ordinal numerals are typically adjectival (e.g. English, Hebrew), and collective numerals are typically nominal—as is exemplified by the following data from Zulu (Cushing 1977:4-5). Numeral stems, e.g. hlanu "five" may be preceded with either an adjectival concord prefix, e.g. ezi-, or a pronominal prefix, e.g zon-; resulting are numerals belonging, respectively, to cardinal and collective series:

(16) a. ezihlanu "five"
    b. zonhlanu "all five"

In subsequent chapters, it is shown that—like other adnominal numeral series—adnominal distributive numerals may belong to a variety of syntactic categories, e.g. noun, adjective, verb. However, it will also be argued that adnominal distributive numerals may never belong to the category of determiner. In fact, it is claimed that languages possessing adnominal distributive numerals do not possess the syntactic category of determiner, or, equivalently, do not distinguish between the syntactic categories of common noun phrase and determined noun phrase. Our study of distributive numerals will thus call into question the
centrality of the distinction between common and determined noun phrases characteristic of most current work in Extended Standard Theory and Formal Semantics.

3.2.2 Other Numerals Qualifying Nouns

Hitherto, we have considered adnominal numerals, i.e. numerals occurring in construction with the nouns they qualify semantically. However, numerals qualifying nouns do not always enter into constructions with them; they may, alternatively, occur adverbially, or in construction with a verbal phrase of which the qualified noun is an argument.

Many scholars, e.g. Cassirer (1923), Capell (1965, 1969), Stein (1981:162), have distinguished between languages with highly developed nominal systems and languages where the greatest richness is to be found in the verbal system: Capell accordingly proposes a typology of object dominated and event dominated languages.\(^1\) With respect to numerals, Capell's study of some non-Austronesian New Guinea languages leads him to propose a subtype of event dominated languages which he calls numeral dominated—where numerical markers qualifying nouns occur on the verb. Similarly, Stein (1981:162-163) notes that in Thai, quantificational structure is typically introduced through the verbal, rather than the nominal system.

With respect to numerals qualifying nouns, we shall find it advantageous to expand the above dichotomy into a three-way distinction between the following construction types (and languages typically exhibiting them): (a) numerals in construction with nouns; (b) adverbial numerals; and (c) numerals in construction with verbs. Having already
considered the first type in some detail in the previous section, we shall now examine, in turn, the latter two types.

In Hebrew, definite numerals may occur adnominally, as in (17a), or adverbially, as in (17b,c):

(17) a. Šlošet hayeladim šaru
    three-of-f the-boys sang-3pl

b. Hayeladim šloštam šaru
    the-boys three-of-f-3plm sang-3pl

c. Hayeladim šaru šloštam
    the-boys sang-3pl three-of-f-3plm

"The three boys sang"

While in Hebrew the adverbial constructions are more marked, an opposite situation obtains in Japanese (Kuno 1973:26); there, adverbial numeral phrases, as in (18b), are more natural than adnominal numerals phrases, as in (18a):

(18) a. Issatsu no hon o kaitai
    one-volume of book acc buy-want

b. Hon o issatsu kaitai
    book acc one-volume buy-want

"I want to buy a book"

(Cf. also sentence (3b) chapter 2, with one adnominal numeral phrase and one adverbial.) Interestingly, non-numerical quantifying expressions would appear to occur more frequently in adverbial position than numerals qualifying nouns.² However, in this dissertation, we shall be concerned with what are perhaps the most common type of adverbial numerals qualifying nouns, namely, the adverbial distributive numerals.

43
Numerals qualifying nouns but occurring in construction with verbal phrases are rare. Capell cites examples from two New Guinea languages, Mer and Kiwai; the following, from Kiwai, is typical:

(19) Nibimirisamari

"We three will eat two"

In the above example, orus(o) "eat" is the verbal stem; iris(o) is a plural object form. This stem is affixed with two numerals qualifying two arguments of the verb: a prefix ibim- "three-sj" and a suffix -ama "two-obj". (Also occurring in (19) are a first person prefix n- and a future suffix -ri.) Unfortunately, Capell does not indicate if and how verbal forms such as (19) may occur with full NP arguments, and whether Kiwai has parallel series of adnominal numerals. Again, as is the case for adverbial constructions, non-numerical quantifying expressions occur much more frequently in constructions with verbs.3

3.2.3 Numerals Qualifying Other Constituents

Although occurring in construction with nouns, adverbially, or in construction with verbs, all the numerals considered hitherto semantically qualify a noun or a nominal phrase. However, as we shall see in this section, numerals may also qualify expressions of other syntactic categories, e.g. verbs and adjectives.

Consider the following English sentences:

(20) a. Three boys sang

b. The boys sang three times

Whereas in (20a) the numeral three qualifies a nominal head boys, in (20b) the numeral phrase three times may be viewed as qualifying a
verbal head *sang*. Syntactically, *three times* appears to be less closely associated to *sang* in (20b) than *three* is to *boys* in (20a); the numeral qualifying a verb in (20b) is perhaps more appropriately compared to adverbial numerals qualifying nouns—as in, say (18b). The analogy between *three* in (20a) and *three times* in (20b) is further obscured by the fact that the latter construction contains what is essentially a classifier expression *times*; the numerically qualified verbal phrase *sang three times* might perhaps be more appropriately paralleled to a numerically quantified mass noun phrase such as *three cups of tea*. In other languages, however, sentences corresponding to (20a) also contain a numerical classifier, thereby rendering more transparent the analogy between numerals qualifying nouns and numerals qualifying verbs. For example, in Turkish (21a) the numeral expression qualifying a noun consists of *üç* "three" plus a classifier *tane* "unit", while in (21b) the numeral expression qualifying a verb contains *üç* "three" plus a classifier *defa* "times".

(21) a. Üç tane çocuk şarki söyledi
    three unit boy song sang
    "Three boys sang"

    b. Çocuklar Üç defa şarki söylediler
    boys three time song sang-pl
    "The boys sang three times"

In yet other languages, no classifiers are required for numerals qualifying either nouns or verbs—and the same forms of the numeral are used in either instance. Thus, in Maricopa sentence (22a), the subject of the verb *x̂mok*—"three" is a noun, while in (22b) it is a full sentence, consisting in effect of a verbal form with different-subject switch—
reference marker -m. In both sentences, the numeral qualifies its head: a noun in (22a), and a verbal phrase in (22b).

(22) a. mxaan\textsuperscript{ī}s\textsuperscript{ī} xmokk
   boys-dem-nom 3-three-sg-real
   "The boys number three"

b. ašvarm xmokk
   3-sang-sg-ds 3-three-sg-real
   "His/her singing numbers three" i.e.
   "He/she sang three times"

The English, Turkish, and Maricopa sentences above underscore a fundamental logical similarity between nouns and verbs—-one that is all too often ignored, in particular within those theories of grammar that set store by a basic syntactic-semantic opposition between function and argument, or operator and operand, e.g. Jackendoff (1977), Keenan (1981). To wit, both nouns and verbs may be treated as either singular or plural, and both nouns and verbs may exhibit a count/mass distinction. Thus, for example, in each of (20-22b) the verb is rendered plural by the qualifying numeral. Moreover, while English treats boys in (20a) as count but sang in (20b) as mass, Turkish treats both çocuk in (21a) and gagka söylediler in (21b) as mass.\footnote{The same will be argued in chapter 8 to be the case for Maricopa sentence (22).} This parallel entails a logical similarity between numerals qualifying nouns and numerals qualifying verbs, both of which may be viewed as realizations of a single more abstract notion of number.\footnote{By positing an underlying logical similarity between numerals as qualifiers of nouns and verbs, it is possible to account for a variety of morphosyntactic facts concerning numerals fulfilling these two.

46
related semantic functions. For example, many languages have a series of numerals qualifying verbs derived by morphological processes from their counterparts qualifying nouns:

(23) a. **Mundari**  

<table>
<thead>
<tr>
<th>Upania</th>
<th>upansa</th>
</tr>
</thead>
<tbody>
<tr>
<td>four</td>
<td>four-times</td>
</tr>
</tbody>
</table>

b. **Mongolian**  

<table>
<thead>
<tr>
<th>tabun</th>
<th>tabunta</th>
</tr>
</thead>
<tbody>
<tr>
<td>five</td>
<td>five-times</td>
</tr>
</tbody>
</table>

c. **Lak**  

<table>
<thead>
<tr>
<th>k'ı</th>
<th>k'illa</th>
</tr>
</thead>
<tbody>
<tr>
<td>two</td>
<td>two-times</td>
</tr>
</tbody>
</table>

d. **Latin**  

<table>
<thead>
<tr>
<th>sex</th>
<th>sexiens</th>
</tr>
</thead>
<tbody>
<tr>
<td>six</td>
<td>six-times</td>
</tr>
</tbody>
</table>

e. **Xhosa**  

<table>
<thead>
<tr>
<th>thathu</th>
<th>kathathu</th>
</tr>
</thead>
<tbody>
<tr>
<td>three</td>
<td>three-times</td>
</tr>
</tbody>
</table>

It is instructive to contrast such examples, where the form of the numeral varies with the syntactic category of its head (noun or verb), with the more commonplace case of gender agreement, where the form of the numeral varies with a particular morpho-syntactic feature of its head noun. Thus, just as any logical analysis of Hebrew numerals would offer identical treatment (except, perhaps, for a logic of gender) to שִׁשָּׁא "six-m" and שֶׁש "six-f", so, it seems, any logical analysis of Latin numerals ought to treat sex "six" and sexiens "six times"
identically—except for a specification of the syntactic category of
the expression qualified by the numeral.

The parallel between these two systems of numeral inflection is
highlighted by the following data from Yurok (Robins 1958:86–91). In
Yurok, numerals are inflected according to an intricate classificatory
system comprising several dozen categories; following are a few typical
examples:

(24) a. nahksey\* "three" (for human beings)
b. nahksoh "three" (for round things, rocks, dollars)
c. nahksek "three" (for worms, snakes, ropes)
d. nahksepir "three" (for length of dentalium shells)
e. nahksemoy\* "three" (for days)
f. nahksemei "three" (for times)

Yurok thus possesses a complex gender-like system of numeral modifica-
tion. However, while the forms in (24a–d) exemplify numerals qualify-
ing nouns, (24f), and perhaps also (24e), exemplify numerals qualifying
verbs. The Yurok numeral inflectional system thus jointly reflects
both semantically motivated gender-like distinctions, and the syntactic
categorial distinction between noun and verb—thereby underscoring the
aforementioned analogy between the two systems. (Analogous arguments
could of course be constructed with respect to numeral classifier
phrases in Turkish and other languages.)

A particularly interesting overlap between these two systems has
taken place in colloquial Hebrew. In Hebrew, numeral phrases look much
like in English: numerals qualifying nouns frequently occur without
classifiers, but a classifier pe\*alamim "times" is obligatory for numerals
qualifying verbs. However, the classifier pešamim has been generalized to occur also in numeral phrases qualifying nouns, where its specific meaning is "order" or "portion", with respect to items of food. Thus, the following sentence is ambiguous as to whether the numeral phrase šalos pešamim qualifies the verb hizmanti "I ordered"—in which case it means "three times", or the noun pilpel memule "stuffed pepper"—in which case it means "three portions".

(25) Hizmanti šalos pešamim pilpel memule
ordered-lsg three-f times pepper stuffed-m

a. "I ordered some stuffed pepper three times"
   (possibly one portion)

b. "I ordered three portions of stuffed pepper"
   (possibly once)

The above example indicates that the classifier pešamim may function not only to distinguish between numerals qualifying nouns and numerals qualifying verbs, but, also, as one of many semantically specific classifiers of numeral phrases qualifying nouns. In doing so, it provides further support for the underlying logical unity of numerals such as šalos qualifying nouns and verbs.

The above examples have all been of ordinary numerals qualifying verbs. Other absolute numeral series, however, may also qualify verbs. For example, Hebrew has a series of ordinal numerals qualifying verbs:

(26) CARDINAL ORDINAL ORDINAL QUALIFYING VERB
šes šisit baisit
"six-f" "sixth-f" "for-the-sixth-f (time)"

Similarly, Ilocano has a series of restrictive numerals qualifying verbs (Blake 1907:252):
(27) \begin{align*}
\text{CARDINAL} & \quad \text{QUALIFYING VERB} & \quad \text{QUALIFYING VERB} \\
\text{innem} & \quad \rightarrow \quad \text{maminm} & \quad \rightarrow \quad \text{mimipinnem} \\
"six" & \quad \rightarrow \quad "six-times" & \quad \rightarrow \quad "only-six-times"
\end{align*}

As we shall see in subsequent chapters, distributive numerals may also qualify verbs, e.g. Georgian \textit{ekvs-ekvsjer} "six times each" or "in sets of six times". These uses of distributive numerals will be of considerable theoretical interest. Following our observations in this section concerning the application of the singular/plural distinction to verbs, it is argued in chapter 4 that a (numerically qualified or other) verb may enter into a relation of distributivity with a (numerically qualified or other) noun—just as, as is more commonly acknowledged, two nouns may enter into such a relation. These facts are subsequently invoked, in chapter 5, to support an analysis of class B interpretations of distributive numerals whereby the numeral, although qualifying a noun, induces a relation of distributivity over a verbal phrase. The behaviour of verbs with respect to the logical notions of number and distributivity will be of considerable importance throughout this dissertation.

Numerals may also qualify expressions of categories other than noun and verb; we shall have particular reason to consider numerals as qualifiers of adjectives. Constructions involving numerals qualifying adjectives are considerably more idiosyncratic than the corresponding constructions with nouns and verbs; in particular, it is unclear to what extent these constructions are lexical, rather than syntactic. Nevertheless, as the English examples below indicate, such constructions are quite widespread:
(28)  a. Three-legged (chair)
       b. Three-sided (problem)

(29)  a. Thrice-translated (novel)
       b. Thrice-convicted (criminal)

(30)  a. Tri-coloured (flag)
       b. Tri-consonantal (root)

In chapter 4 we shall see that a numerically qualified adjective may, like other numerically qualified expressions, enter into relations of
distributivity with other constituents. This will prove to be of
importance in chapter 5, where it is argued that class C interpretations
of constructions containing adnominal or adverbial distributive numerals
result from a phrase-internal relation of distributivity.

This concludes our survey of the syntax and semantics of numerals.
After observing the variety of syntactic constructions exhibited by
numerals qualifying nouns, we saw that numerals may also qualify verbs
and adjectives; thus, three, three times, and tri- are three syntactically conditioned reflexes of a single logical notion of number. In the
next chapter, we shall see that the similar behaviour of diverse syn-
tactic categories with respect to numerals is paralleled by their
similar behaviour with respect to the semantic relation of distributivity
—to which we now turn.
Footnotes - Chapter 3

1 Thus, for example, Cassirer (1923:271) writes:
"Certain languages and groups of languages have developed
the nominal type in full sharpness and purity, their whole
structure seems to be dominated by the intuition of objects,
while in others both grammar and syntax are determined by
the verb."

2 Consider, for example, the well-known cases of so-called
"quantifier float"

(i) a. English
   The boys all sang

b. French
   Les garçons ont tous chanté
   the-pl boys have-3pl all sung-sg

In other languages, quantifying expressions can only occur adverbially:

(ii) a. Tamang (Mazaudon 1976:17)
   Sùn tì naŋkar lâmo ă khâ muîa
   rice top nowadays much not come is
   "We don't get much rice nowadays"

b. Hausa
   Nàá sàýí áwáakíi dà yàwàa
   I bought goats with abundance
   "I bought lots of goats"

In both Tamang and Hausa, there are no alternative constructions where
the quantifying expressions (lâmo and yàwàa) or equivalents thereof
occur adominally.

3 For example, in Nqizim, a universal quantifier qualifying a
direct object may occur as a verbal suffix:

(i) Na mas³-naa tluwai
   I bought-all meat
   "I bought all the meat"

(cf. also English up in I bought up the meat.)

4 Conclusions similar to the above were arrived at in a detailed
(1963:161) and J. Moravcsik (1970) also posit a count/mass distinction
for all syntactic categories, and not just nouns. And McCawley (1969:162) writes that "semantically, five times is identical to the five or five horses", adding that "time is an 'empty' morpheme which is inserted to support a numerical adjunct to an unnominalized verb".

It should be added that for non-numerical quantifying expressions, the parallel between nouns and verbs is, again, more apparent; thus, in (i/a) some qualifies boys, while in (i/b) some qualifies sang. (Sentence (i/b) is grammatical in only some dialects of English.)

(i)

a. Some boys sang

b. The boys sang some

More generally, it would appear that various verbal inflectional categories such as aspect, repetitiveness, punctuality, etc., bear much of the burden of quantification within the verbal system—see Leech (1969) for specific examples.

5 In an insightful passage, Cassirer (1923:239) characterizes these two realizations as the spatial and temporal respectively:

"The concrete idea of number, as expressed in language, makes use of both achievements, that of the spatial, and that of the temporal consciousness, and through them develops two different factors of number. Through the differentiation of spatial objects, language arrives at its concept of collective multiplicity—through the differentiation of temporal acts, it arrives at its expression of particularity and separation. This twofold concept of number seems to be clearly manifested in plural formation, which may be governed either by the intuition of complexes of things or by the rhythmically recurrent phases of a specific temporal process; in the one case it is oriented predominantly toward objective totalities consisting of multiple parts, in the other toward the repetition of events or actions linked together in an unbroken sequence."

53
Chapter 4

4. The Syntax and Semantics of Distributivity

We may embark on our study of distributivity by considering, once again, English sentence (2a) of chapter 2, reproduced below:

(1) Two men carried three suitcases each

Intuitively, we would like to be able to say that in the above sentence, the expression three suitcases each distributes over the expression two men. Distributivity is thus a binary semantic relation holding between pairs of expressions, though, in addition, it may also possess syntactic reflexes, e.g. the morpheme each in (1) above.

In this chapter, we explore the notion of distributivity: its composite nature--4.1, the environments in which it occurs--4.2, the ways in which it is expressed--4.3. Although questions involving distributivity are at the forefront of current theoretical research into syntax and semantics--e.g. Jackendoff (1972), Lakoff (1971), Montague (1970, 1973), Keenan and Paltz (1978, 1980), to cite but a few examples--an adequate linguistic description of the notion of distributivity has not, it seems, yet been produced. It is the goal of this chapter to provide such a description. In the course of this chapter, many previous insights into the notion of distributivity--e.g. by Leech (1969), McCawley (1969), Hudson (1970), Kempson and Cormack (1981), Gil (1982a, to appear c)--are incorporated and generalized. However, the approach developed in this chapter goes beyond all previous approaches in several respects. One important departure--presented in section 4.1--is in the

54
consideration of distributivity as a composite relation involving both the individual collective distinction and scope dependency relations. Another important innovation--discussed in section 4.2--is in the unified analysis of distributivity as a binary relation obtaining between expressions of a variety of different categories, within clauses and phrases. The approach developed in this chapter will subsequently provide the basis for the analysis of distributive numerals to be proposed in chapter 5.

4.1 The Nature of Distributivity

As noted in section 2.3.3, the three classes of interpretations of sentences containing distributive numerals involve clusterings of a number of independent semantic properties. In light of those observations, we shall argue in this section that distributivity is a complex semantic relation involving both the individual/collective distinction, and a quantifier scope dependency.

Consider the following English sentence:

(2) Two men carried three suitcases

In order to examine the possible relations of distributivity that may obtain between the NPs two men and three suitcases in (2) above, we shall consider, in turn, the individual/collective distinction as it may apply to each of the NPs, and the possible scope relations that may obtain between the two expressions.

To begin, note that each of the two NPs may, independently of the other one, be interpreted either individually or collectively. Thus, the men may have acted separately, each person by himself, or together,
in a joint effort. Similarly, the suitcases may have been acted upon separately, one at a time, or together, in a joint load.

Independently of the above distinctions, a variety of quantifier scope relations may obtain between the two NPs. Following Kempson and Cormack (1981) and Gil (1982a, to appear c), we shall distinguish four possible scope relations that may obtain between two men and three suitcases; these four scope relations define, in turn, four classes of interpretations of sentence (2):

(3) a. Asymmetric Interpretations (wide scope for two men)

There exist two men, for each of which there exist three suitcases, such that each of the two men carried each of the corresponding three suitcases;

b. Asymmetric Interpretations (wide scope for three suitcases)

There exist three suitcases, for each of which there exist two men, such that each of the three suitcases was carried by each of the corresponding two men;

c. Strong Symmetric Interpretations

There exist two men and three suitcases, such that each of the two men carried each of the three suitcases;

d. Weak Symmetric Interpretations

There exist two men and three suitcases, such that each of the two men carried at least one of the three suitcases, and each of the three suitcases was carried by at least one of the two men.

We shall use the following abbreviations to denote the four scope relations indicated above:

(4) a. two men > three suitcases

(asymmetric interpretations, wide scope for two men)

b. two men < three suitcases

(asymmetric interpretations, wide scope for three suitcases)
c. two men $\simeq$ three suitcases
   (strong symmetric interpretations)

d. two men $\sim$ three suitcases
   (weak symmetric interpretations)

A more precise definition of these four scope relations would require
the development of a formal semantic theory—an endeavor which is beyond
the scope of this dissertation. We shall rely, instead, on an intuitive
understanding of these scope relations, as exemplified above.

As is pointed out in Gil (1982a, to appear c), these four scope
relations are not logically independent; rather, in the above example,
the following entailments hold:

(5) (3d) $\supset$ (3a) $\supset$ (3c)
   (3b) $\supset$ (3c)

More generally, $\simeq$ is the most specific scope relation of the four, en-
tailing each of the other three relations—$\triangleright$, $\langle$, and $\sim$. However,
for non-numerical quantifiers, the logical relations between the four
scope relations often degenerate, the various scope relations collapsing
into one another. For example, sentence (6) exhibits only two classes
of interpretations: one, as indicated in (7a), defined by the scope
relation $\triangleright$; another, as shown in (7b), defined by the scope relation
$\langle$, $\simeq$, and $\sim$, which, for the particular choice of universal and exist-
tential quantifiers in (6), are rendered equivalent.

(6) Every man carried some suitcase

(7) a. every man $\triangleright$ some suitcase

   b. every man $\simeq$ some suitcase
What (7b) shows, then, is that for sentence (6), the class of interpretations for which a single suitcase has wider scope ($<$) is equivalent to the two classes of symmetric interpretations ($\approx$ and $\sim$), in which each of the two NPs independently refers, and no scope dependency obtains. (Note, also that in the above example, (7b) entails (7a).) In sentences such as John carried this suitcase, all four classes of interpretations are equivalent.

As noted before, the various scope relations are logically independent of the individual/collective distinction as it applies to each of the two expressions between which the scope relations obtain. Consider, for example, the strong symmetric interpretation $\approx$, as it applies between two men and three suitcases in (2). All that $\approx$ stipulates is the existence of a unique set of two men and a unique set of three suitcases, such that each of the men carried (or was involved in a carrying activity with) each of the suitcases. The scope relation $\approx$ is thus clearly consistent with both individual and collective interpretations of the NP two men, and with both individual and collective interpretations of the NP three suitcases.

Of greater interest, however, is the interaction of the asymmetric interpretations $>$ and $<$ with the individual/collective distinction. Clearly, the scope relation two men $>$ three suitcases is consistent with both individual and collective interpretations of the NP three suitcases. Less obvious, however, is whether it is consistent with both individual and collective interpretations of the NP two men: when faced with a scope dependency such as the above, speakers generally express a strong preference for individual interpretations of the expression with wider
scope—in the above example, two men. Nevertheless, it is possible to construct interpretations of sentence (2) in which two men has wider scope than three suitcases but is interpreted collectively, rather than individually; this is easier to see when the two sets of three suitcases are allowed to overlap or coincide. Thus, for example, recalling that (3c) entails (3a), any interpretation of the class two men ≈ three suitcases where two men is interpreted collectively will also be an interpretation of the class two men > three suitcases, where two men is interpreted collectively.¹

It is thus of considerable interest that speakers do in fact prefer to interpret expressions with wider scope individually, rather than collectively. For it is this particular clustering of properties, jointly specified in terms of the individual/collective distinction and the various scope relations, which defines the notion of distributivity. To wit, we shall say that expression B distributes over expression A if and only if the following two conditions hold: (a) A is interpreted individually; and (b) A > B. In what follows, we shall make frequent use of an arrow to denote the relation of distributivity, writing, in the above case, A ← B. For example, we may now represent the two relations of distributivity that may obtain between the subject and object NPs in (2):

\[
\begin{array}{c}
\text{a. [Two men] carried [three suitcases]}
\\
\text{(i) two men interpreted individually}
\\
\text{(ii) two men > three suitcases}
\\
\text{b. [Two men] carried [three suitcases]}
\\
\text{(i) three suitcases interpreted individually}
\\
\text{(ii) two men < three suitcases}
\end{array}
\]

59
The relation of distributivity thus effects a particular grouping of semantic properties, one that is not, in any sense, logically necessary. It would be just as easy to define an alternative notion, call it *distributivity, which would involve, say, individual interpretations of the expression with narrower scope, rather than of that with wider scope. Natural languages, however, make extensive use of distributivity, and, apparently, no use whatsoever of *distributivity. For example, speakers prefer interpretations of (2) involving distributivity over interpretations involving *distributivity. Similarly, as we shall see in section 4.3, languages have a variety of means of marking distributivity, e.g. English each—but none for marking *distributivity. And, of course, distributive numerals—as we shall see in subsequent chapters—also mark distributivity, never *distributivity. That natural languages afford such a central role to distributivity, and, at the same time, no role whatsoever to *distributivity, is a striking instance of the arbitrariness—in the Saussurean sense—of the logic underlying natural languages.

4.2 The Domain of Distributivity

Distributivity is thus a complex binary relation holding between pairs of constituents. In this section, we shall show that distributivity may obtain between expressions of a variety of syntactic categories, within clauses and phrases, e.g. NP and VP, noun and adjective, noun and numeral. As a first step, however, it is convenient to consider distributivity as it applies within the domain most commonly attributed to it, that discussed in the previous section—namely, between two NP in a clause.
4.2.1 Clausal Distributivity Between Two Noun Phrases

In the previous section, it was suggested that sentences such as (2), *Two men carried three suitcases*, may have a variety of interpretations depending on whether each of the two NPs is interpreted individually or collectively, and on which scope relation obtains between the two NPs. Moreover, two particular constellations of these semantic parameters were suggested in (8) to yield two possible relations of distributivity obtaining between the subject and object NPs. These claims, however, are worthy of some further scrutiny. In particular, while it is quite clear that each of the NPs in (2) may be interpreted either individually or collectively, it is less clear whether each and every one of the four classes of interpretations defined by the four scope relations in (3) is in fact assigned by speakers of English to sentences such as (2).

In Gil (1982a,b, to appear c), some results of a cross-linguistic questionnaire survey involving quantifier scope are reported upon. In the survey, speakers of a number of unrelated languages—Dutch, Hebrew, Bengali, and Batak—were asked to judge various potential interpretations of sentences of form similar to (2), cf. footnote 25, chapter 9. The results of the survey indicate a strong preference for symmetric interpretations, i.e. those in which each of the two NPs independently refers, over asymmetric interpretations, i.e. those in which one of the two NPs falls within the scope of the other. In particular, strong symmetric interpretations are preferred over all others. Nevertheless, significant (if not large) numbers of speakers do obtain asymmetric interpretations of sentences such as (2)—thereby indicating that these
are indeed possible interpretations. In particular, the results of the survey lend empirical support to the claim that in (2) either of the two NPs may distribute over the other—as represented in (8). More generally, the questionnaire results indicate that in sentences like (2), each of the four scope relations may obtain between subject and object NPs.

Of particular interest are the relative preferences of the various asymmetric interpretations. In general, the results of the survey indicate a preference for interpretations in which a subject NP has wider scope than a direct object NP over interpretations in which a direct object NP has wider scope than a subject NP. As a result, interpretations in which a direct object NP distributes over a subject NP, as in (8a), are preferred over interpretations in which a subject NP distributes over a direct object NP, as in (8b). The results of the survey thus lend support to the existence of a grammatical relations quantifier scope hierarchy as posited, among others, by Ioup (1975) and Keenan (1976). As we shall see in the continuation, this hierarchy also governs the occurrence of syntactic markers of distributivity—section 4.3.1, and, in particular, distributive numerals—section 5.1.2.

A further important result to emerge from the questionnaire survey is the existence of considerable variation—cross-linguistic, dialectal, idiolectal, and in the judgements of a single speaker over time—with respect to the semantics of quantifier scope. To begin, as noted in Gil (1982b), quantifier scope in some Austronesian languages is governed by a thematic relations hierarchy at variance with the usual grammatical relations hierarchy characteristic of most other languages. Secondly,
within each language, a great degree of variation was exhibited by
speakers of different dialects and/or idiolects, and, in those cases
where retesting was performed, by the very same speaker. As we shall
see in subsequent chapters, such variation is also very typical with
respect to the interpretations of sentences involving distributive
numerals: different speakers provide different judgements, and the
same speaker changes his/her mind from one week to the next. As is
argued in Gil (1982a, to appear c), any theory of natural language
quantification must take all such forms of variation into account.

4.2.2 Clausal Distributivity Between Other Constituents

So far, we have considered the relation of distributivity only
as it applies between two NPs in a clause. We should like to argue,
however, that distributivity may also obtain between a NP and a verb or
VP.

Many scholars—in e.g. Gleitman (1965), Lakoff and Peters (1966),
have discussed semantic contrasts such as those exemplified in (9) and
(10) below:

(9) a. \{ The boys \\
    \{ John and Bill \} \} slept (individual)

 b. \{ The boys \\
    \{ John and Bill \} \} assembled (collective)

 c. \{ The boys \\
    \{ John and Bill \} \} sang (both)
(10) a. \{The boys John and Bill\} are tall (individual)
    
    b. \{The boys John and Bill\} are similar (collective)
    
    c. \{The boys John and Bill\} are noisy (both)

Whereas in (9,10a) the subject NP is interpreted individually, in (9,10b) it is interpreted collectively, and in (9,10c) it may be interpreted either individually or collectively. Thus, for example, in (9c) the boys may have sung either separately, one at a time, or in a single joint action—while in (10c), each particular boy may be noisy, or, alternatively, the boys may be noisy as a whole, each individual boy contributing but a few decibels to the overall racket.

It is perhaps less commonly acknowledged that the same semantic contrast exhibited by the subject NPs in (9) and (10) may also be exhibited by predicates—either verbal, as in (11), or adjectival, as in (12):

(11) a. John went to MIT and became a novelist (individual)
    
    b. John went to MIT and became an engineer (collective)
    
    c. John sang and danced (both)

(12) a. This flower is large and blue (individual)
    
    b. This flower is red and blue (collective)
    
    c. This problem is many-faceted (both)

In sentence (11a), the conjoined VP is naturally interpreted individually; each conjunct denotes a separate activity, there being little or
no connection between the two conjuncts. In (11b), however, the conjoined VP is naturally interpreted collectively, in a world in which going to MIT and becoming an engineer may be construed as a single complex activity. And in (11c), the conjoined VP may be interpreted either individually or collectively, depending on whether the singing and dancing were performed separately or together. Similarly, in (12a) each of the properties is possessed separately by the flower, while in (12b) both properties are possessed together: the flower is neither red nor blue, but, presumably, partly red and partly blue. Finally, in (12c) the many facets may characterize the problem separately, or, conversely, they may be inexorably intertwined so as to form one single whole, interpreted collectively. Thus, to conclude, both subject NPs and their predicate VPs may be interpreted either individually or collectively.4

Similarly— as noted by McCawley (1969:152-153, 161-162) and Hudson (1970:224-231)— subjects and VPs may exhibit the same range of scope relations as is exhibited by, say, subjects and direct objects. Consider, for example, the following sentence, in which, in addition to a numerically qualified subject NP, the VP is also qualified by a numeral— in accordance with the discussion in section 3.2.3:

(13) Three boys sang twice

In the above sentence, each of the four scope relations may hold between the subject NP and the VP:
(14) a. three boys $\supset$ sang twice
There exist three boys, for each of which there exist
two singing events, such that each of the three boys
participated in each of the corresponding two singing
events;

b. three boys $\subset$ sang twice
There exist two singing events, for each of which there
exist three boys, such that each of the two singing
events was participated in by each of the corresponding
three boys;

c. three boys $\approx$ sang twice
There exist three boys and two singing events, such
that each of the three boys participated in each of
the two singing events;

d. three boys $\approx$ sang twice
There exist three boys and two singing events, such that
each of the three boys participated in at least one of
the two singing events, and each of the two singing
events was participated in by at least one of the three boys.

As opposed to sentences such as (2), the semantics of sentences such as
(13) have been sparingly, if at all, studied. However, a cursory
inspection of (13) would appear to indicate that of the four classes of
interpretations indicated in (14), the strong symmetric class (14c) is
the most easily obtainable, while the asymmetric class (14b) is the
most difficult to obtain. If so, these facts would completely parallel
those for subject and direct object discussed previously, with the
strong symmetric scope relation being the most highly preferred, and
the asymmetric interpretations in which the subject NP is within the
scope of another constituent being the least favoured. This parallel
would in turn lend support to the unified treatment of scope relations
as obtaining either between two NPs, as in (2), or between one NP and
a VP, as in (13).
As was the case for two NPs in the previous section, particular subjects and VPs may cause some of the scope relations to collapse into one another. Sentence (15), for example has three (rather than four) distinct classes of interpretations, as indicated in (16); > and ⇀ are rendered equivalent by the conjoined VP are red and blue in (16a):

(15) Three flowers (in this pot) are red and blue

(16) a. three flowers ⇀ are red and blue
    There exist three flowers, each of which is red and blue;

b. three flowers ← are red and blue
    There exist three red flowers and three blue flowers;

c. three flowers ⇀ are red and blue
    There exist three flowers, each of which is either red or blue.

The above example will be of particular interest in the following section.

We have thus shown that both subject NPs and VPs may be interpreted either individually or collectively, and may enter into scope relations with each other. Recalling, now, our composite semantic characterization of distributivity in section 4.1, we may conclude that the relation of distributivity may also obtain between subjects and VPs.

To wit, just as (2) gave rise to the two relations of distributivity between subject and direct object NPs in (8), so sentence (13) may yield two relations of distributivity between the subject NP and the VP, as indicated below:

(17) a. [Three boys] ← [sang twice]

   (i) three boys interpreted individually

   (ii) three boys > sang twice
b. [Three boys] $\rightarrow$ [sang twice]

(i) sang twice interpreted individually
(ii) three boys $\prec$ sang twice

While in (17a) the VP distributes over the subject NP, in (17b) it is the subject NP which distributes over the VP.

Similar examples may be constructed with respect to verbal phrases and NPs of other grammatical relations. For example, in sentence (18), either of two relations of distributivity may obtain between a (discontinuous) verbal phrase sang ... twice and the direct object NP ten arias.

(18) Dan sang ten arias twice

a. Dan [sang twice] $\rightarrow$ [ten arias]

b. Dan [sang twice] $\leftarrow$ [ten arias]

Interesting examples of distributivity between verbal phrases and NPs can be adduced from languages with frequentative verb constructions. In Hebrew, for example, the quantifier harbe "much" may directly modify a verb, e.g. יָחַר harbe "sang-3sgm much" or "sang a lot". However, an alternative construction is available whereby the quantifier harbe is verbalized, and the erstwhile verb is adjoined in infinitival form, e.g. הירבע הָאָשֶׁר hirba lašir "muched-3sgm to-sing". In the following sentence, either of two relations of distributivity may thus obtain between the frequentative verbal phrase hirba lašir and the direct object NP Ġeser aryot "ten arias".

(19) Dan hirba lašir Ġeser aryot

Dan muched-3sgm to-sing ten-f arias
"Dan sang ten arias a lot"
Further examples of distributivity obtaining between a frequentative verbal phrase and a direct object NP will be adduced from Kiwai in section 4.3.2.

4.2.3 Phrasal Distributivity Between Adjectives and Nouns

Hitherto, we have considered only instances of clausal distributivity, that is, between clausal constituents such as NPs and VPs. However, in this section, we shall see that distributivity may obtain also within phrases. Consider the following instances of distributivity:

(20) a. [Two men] are carrying [three suitcases each]
   b. [Two men] carrying [three suitcases each]
   c. [Two men] with [three suitcases each]

While in (20a) distributivity obtains between two NPs in a clause, in (20b) and (20c) it obtains between two NPs within a complex NP; moreover, in (20c) there is no intervening relative clause, or S-node, between the bottom and top NPs. Clearly, the sentences in (20a,b,c) exhibit a similar range of interpretations; in doing so, they attest to the possibility—exemplified in (20b,c)—that distributivity may obtain between constituents phrase-internally.

We shall be interested, however, in cases where distributivity obtains within simple, rather than complex NPs, between a nominal head and an adjective (this section) or a numeral (next section). To begin, we may note the existence of an individual/collective distinction in the interpretation of the following nouns, in construction with adjectives:

(21) a. Tall boys, blue flowers, sleeping students
       (individual)
b. Similar boys, parallel streets, colliding cars
   (collective)

c. Noisy boys, heavy suitcases, pretty flowers
   (both)

Thus, for example, the noun boys is interpreted individually in (21a),
collectively in (21b), and either individually or collectively in (21c).
Observe the parallel between the individual/collective distinction as
it applies to the nouns in (21), and to the subject NPs in (9) and (10);
thus, the interpretations of, say, The boys are noisy, correspond to
those of noisy boys.

Conversely, adjectives may be interpreted either individually or
collectively when in construction with a head noun:

(22) a. Large blue flower, twice-conquered peak
   (individual)

b. Red and blue flower, five-sided figure
   (collective)

c. Singing and dancing boy, many-faceted problem
   (both)

Thus, for example, large blue is interpreted individually in (22a),
while red and blue is interpreted collectively in (22b); singing and
dancing may be interpreted either individually or collectively in (22c).
Note that for an adjectival phrase to exhibit the individual/collective
distinction, e.g. large red, or by numerical qualification, e.g. twice-
conquered; examples such as (22) are consequently somewhat more complex
than those in (21), where it suffices for the noun to be marked as
plural with the suffix -s for it to be able to exhibit the individual/
collective distinction. Nevertheless, the examples in (22) are, once
again, parallel to those in (11) and (12), where a VP exhibits the individual/collective distinction.

Adjectives and their head nouns may also enter into scope relations; if both adjective and noun are numerically qualified, all four scope relations are potentially obtainable. For example, the NP in (23) may exhibit each of the four scope relations represented in (24):

(23) Three two-coloured flowers

(24) a. three flowers \( \supset \) two-coloured
Three flowers, each of two colours;

b. three flowers \( \subset \) two-coloured
Three flowers of one colour, and three flowers of another colour;

c. three flowers \( \approx \) two-coloured
Three flowers, each of the same two colours;

d. three flowers \( \sim \) two-coloured
Three flowers and two colours, some flowers one colour, some flowers another colour.

In actual fact, however, it would seem that only (24a) and (24c) are available to speakers of English.

Consider, now, example (25) below. Like sentence (15), discussed in the previous section, it potentially exhibits three classes of interpretations, as indicated in (26)—two of the scope relations having collapsed into one:

(25) Three red and blue flowers

(26) a. three flowers \( \supset \) red and blue

b. three flowers \( \subset \) red and blue

c. three flowers \( \sim \) red and blue
The results of a cross-linguistic survey on the interpretations of NP (25) and its equivalents in other languages reveals a universal preference for the strong symmetric interpretation (26a). Some speakers also obtain the weak symmetric interpretation (26c), and a very few also accept the asymmetric interpretation (26b). The results of the survey accordingly indicate that all three classes of interpretations are potentially available. The pattern of preferences, however, is once again, parallel to that characterizing scope relations between two NPs in a clause, with a strong preference for symmetric interpretations over asymmetric ones. The recurrent pattern accordingly supports our analysis of the interpretations of NPs (23) and (25) in terms of the same scope relations exhibited in sentence (2) and (13):

Since both nouns and adjectives may embody the individual/collective distinction, and since nouns and adjectives may enter into scope relations, we may conclude that the relation of distributivity may also obtain between nouns and adjectives. For example, with respect to NP (25) we may have either of the following:

(27) a. three flowers ←− red and blue
    b. three flowers −→ red and blue

As opposed to the examples involving clausal distributivity, English does not make use of an adverbial expression each to force distributivity in such cases: English does not have *Three each red and blue flowers for (27b). However, as we shall see in section 5.1.3, other languages may make use of adnominal distributive numerals to force this type of distributivity. Note, finally, that in the examples in (21a) and (22a), distributivity also obtains, for example:
(28) a. tall ←→ boys

b. large red → flower

Here, distributivity is reflected only by the individual interpretations of the noun in (28a) and the adjective in (28b); due to the fact that tall and flower are semantically singular, no variety of scope relations is available. As we shall see in chapters 7 and 8, Georgian and Maricopa have means of inflecting constructions such as (28c), in order to express the relation of distributivity.

The plot thickens when we turn, next, to consider conjunctions of nouns. Note, first, that in English it is awkward to conjoin singular nouns; doctor and lawyer, for example, means, if anything, "doctor-lawyer", i.e. someone who is fortunate enough to be both a doctor and a lawyer. Hence, barring androgyny, conjunctions such as *boy and girl are impossible. However, plural nouns in English are more easily conjoinable, and, in fact, are ambiguous:

(29) Doctors and lawyers

a. individuals who are doctor-lawyers;

b. individuals who are doctors, and individuals who are lawyers.

Some philosophical implications of this ambiguity are discussed in a series of articles by Foulkes (1972a,b,c).

The following set of examples sheds some interesting light on (29):

(30) a. They interviewed doctors and lawyers

b. They are doctors and lawyers

c. Doctors and lawyers

(=(29))
Sentence (30a) possesses the following two classes of interpretations, specified in terms of the four scope relations:

(31) a. they  $\not\subset$ doctors and lawyers
    Each of them interviewed both doctors and lawyers;

   b. they  $\not\supset$ doctors and lawyers
    Some of them interviewed doctors, and some of them interviewed lawyers.

Substituting are for interviewed, sentence (30b) exhibits two analogous classes of interpretations:

(32) a. they  $\not\subset$ doctors and lawyers
    Each of them are both doctors and lawyers

   b. they  $\not\supset$ doctors and lawyers
    Some of them are doctors, and some of them are lawyers.

But sentence (30b) is semantically equivalent to NP (30c) or (29). Hence, if the variety of interpretations of (30b) is attributable to different scope relations, these scope relations must also be held to account for the two classes of interpretations of NP (29) doctors and lawyers. We may accordingly analyze doctors and lawyers logically as DOCTOR AND LAWYER UNITS (or persons, individuals, things, etc.), with a scope relation obtaining between the logical constituents DOCTOR AND LAWYER, overtly expressed in English as doctors and lawyers, and UNITS, not realized in English surface syntax. 6

(33) a. UNITS  $\not\supset$ DOCTOR AND LAWYER
   Individuals who are doctor-lawyers;

   b. UNITS  $\not\subset$ DOCTOR AND LAWYER
   Individuals who are doctors, and individuals who are lawyers.
We thus propose to account for the "two and's" posited by Foulkes and other philosophers in terms of an independently motivated semantic primitive attested throughout language, namely, scope relations, obtaining—in the present case—phrase-internally, between the conjoined nouns and a covert constituent posited for logical form.

Let us now see what happens when conjoined nouns are modified by an adjective. Boole (1854:33) observes that European men and women is synonymous with European men and European women; however, no semantic theory, it would appear, has yet dealt with the full range of interpretations of constructions such as the following:

(34) Noisy doctors and lawyers

Ignoring the syntactic parsing [noisy doctors] and lawyers, example (34) would appear to possess the following five distinct classes of interpretations:

(35) a. [NOISY \rightarrow \text{UNITS}] \n\nIndividually noisy (units of) doctor-lawyer;

b. [NOISY \text{UNITS}] \n\nCollectively noisy (units of) doctor-lawyer;

c. [NOISY \rightarrow \text{UNITS}] \n\nIndividually noisy (units of) doctor, and individually noisy (units of) lawyer;

d. [NOISY \text{UNITS}] \rightarrow \text{DOCTOR AND LAWYER}
\nCollectively noisy (units of) doctor, and collectively noisy (units of) lawyer;

e.- [NOISY \text{UNITS}] \sim \text{DOCTOR AND LAWYER}
\nCollectively noisy (units of) doctor and (units of) lawyer.
These five classes of interpretations are defined in terms of the logical relations between NOISY and UNITS, and between NOISY UNITS and DOCTOR AND LAWYER. To begin, we may distinguish between interpretations (35a,c) in which NOISY distributes over UNITS, resulting in noisy individuals, and interpretations (35b,d,e) in which UNITS is interpreted collectively, resulting in noisy sets of individuals. Next, we may distinguish between (35a,b) in which the scope relations between NOISY UNITS and DOCTOR AND LAWYER yield doctor-lawyer individuals, and (35c,d,e) in which the scope relations between NOISY UNITS and DOCTOR AND LAWYER yield doctor individuals and lawyer individuals. Finally, note that while the scope relations < and ~ are equivalent in (35c), when NOISY distributes over UNITS, they are no longer equivalent in (35d,e), where UNITS is interpreted collectively. Thus, in (35d) there are two noisy sets of individuals (one of doctors, one of lawyers), while in (35e) there is only one noisy set of individuals (containing both doctors and lawyers).

Note that for both (35c) and (35d) NOISY distributes over another constituent: in the former, it distributes over UNITS, while in the latter, it distributes, in tandem with UNITS, over DOCTOR AND LAWYER. Referring, now, to the overt expressions noisy and doctors and lawyers, we shall say that for (35c) noisy distributes internally over doctors and lawyers, while for (35d) noisy distributes externally over doctors and lawyers. This distinction will be of importance in our analysis of distributive numerals in chapter 5.7

The adjective noisy in (34) has the particular property that when applied to a head noun, that head noun may be interpreted either
individually or collectively. Not surprisingly, when noisy is replaced by an adjective of a more restrictive nature, the range of possible interpretations decreases accordingly. For example, substituting tall for noisy in (36) rules out the classes of interpretations indicated in (37b,d,e), where UNITS is interpreted collectively.

(36) Tall doctors and lawyers

(37) a. \([\text{TALL} \rightarrow \text{UNITS}] \nsim \nsim \[\text{DOCTOR AND LAWYER}]\]
Individually tall (units of) doctor-lawyer;

b. \(*[\text{TALL} \nsim \nsim \text{UNITS}] \nsim \nsim \[\text{DOCTOR AND LAWYER}]\]
Collectively tall (units of) doctor-lawyer;

c. \([\text{TALL} \rightarrow \text{UNITS}] \nsim \[\text{DOCTOR AND LAWYER}]\]
Individually tall (units of) doctor, and individually tall (units of) lawyer;

d. \(*[\text{TALL} \nsim \nsim \text{UNITS}] \rightarrow \[\text{DOCTOR AND LAWYER}]\]
Collectively tall (units of) doctor, and collectively tall (units of) lawyer;

e. \(*[\text{TALL} \nsim \nsim \text{UNITS}] \sim \[\text{DOCTOR AND LAWYER}]\]
Collectively tall (units of) doctor and (units of) lawyer.

Alternatively, substituting numerous for noisy in (38) rules out the classes of interpretations indicated in (39a,c), where NUMEROUS distributes over UNITS.

(38) Numerous doctors and lawyers

(39) a. \(*[\text{NUMEROUS} \rightarrow \text{UNITS}] \nsim \nsim \[\text{DOCTOR AND LAWYER}]\]
Individually numerous (units of) doctor-lawyer;

b. \([\text{NUMEROUS} \nsim \nsim \text{UNITS}] \nsim \nsim \[\text{DOCTOR AND LAWYER}]\]
Collectively numerous (units of) doctor-lawyer;

c. \(*[\text{NUMEROUS} \rightarrow \text{UNITS}] \nsim \[\text{DOCTOR AND LAWYER}]\]
Individually numerous (units of) doctor, and individually numerous (units of) lawyer;
d. \[\text{NUMEROUS UNITS} \rightarrow \text{DOCTOR AND LAWYER}\]
Collectively numerous (units of) doctor, and
collectively numerous (units of) lawyer;

e. \[\text{NUMEROUS UNITS} \sim \text{DOCTOR AND LAWYER}\]
Collectively numerous (units of) doctor and (units of) lawyer.

Remaining are three classes of interpretations: (39b) "numerous
doctor-lawyers", (39d) "numerous doctors and numerous lawyers", and
(39e) "numerous individuals who are doctors or lawyers".

4.2.4 Phrasal Distributivity Between Numerals and Nouns

Example (38), numerous doctors and lawyers, suggests considering
constructions in which a conjunction of nouns is qualified by a numeral
or a related quantifying expression. Consider, for example, the
following:

(40) Several doctors and lawyers

Like (38), (40) possesses three classes of interpretations, in which a
logical constituent UNITS, in construction with SEVERAL, is interpreted
collectively; ruled out are two classes of interpretations in which
SEVERAL distributes over UNITS:

(41) a. *\[\text{SEVERAL} \rightarrow \text{UNITS} \sim \text{DOCTOR AND LAWYER}\]
Units numbering several each, of doctor-lawyer;

b. \[\text{SEVERAL UNITS} \sim \text{DOCTOR AND LAWYER}\]
Units numbering several together, of doctor-lawyer;

c. *\[\text{SEVERAL} \rightarrow \text{UNITS} \not\sim \text{DOCTOR AND LAWYER}\]
Units numbering several each of doctor, and
units numbering several each of lawyer;

d. \[\text{SEVERAL UNITS} \rightarrow \text{DOCTOR AND LAWYER}\]
Units numbering several together of doctor, and
units numbering several together of lawyer;
e. [SEVERAL UNITS] ~ [DOCTOR AND LAWYER]

Units numbering several together of doctors and of lawyers.

Thus, several doctors and lawyers has the same range of interpretations as numerous doctors and lawyers—and these interpretations may be accounted for in the same way, that is, in terms of the logical relations holding between SEVERAL and a hypothetical constituent UNITS, and between SEVERAL UNITS and DOCTOR AND LAWYER. Similar facts hold also for expressions such as all, many, some, a few, etc.⁸

Constructions involving quantifying expressions, rather than adjectives, offer strong additional support for the present analysis. While in English the constituent UNITS in (41) is not overtly expressed, in many other languages it does indeed surface—in the form of a numeral classifier expression. For example, in the Turkish translation of (40), the constituent UNITS is expressed as tane, appropriately glossed in Turkish grammar-books as "unit":

(42) Birçok tane doktor ve avukat
    several unit doctor and lawyer

Turkish and many other languages with numeral classifiers thus provide direct evidence in favour of the analysis of (40) presented in (41).⁹ We shall accordingly refer to UNITS in constructions such as (41) as a classifier constituent.

Our analysis of (40) may be extended straightforwardly to account for similar constructions involving bona fide numerals. Here, however, English speakers' judgements are somewhat less clear. For large numerals, as in (43), it would seem to be the case that while (44b) and (44e) remain acceptable, (44d), involving external distributivity of the
numeral over its conjoined nominal head, is of more doubtful acceptability:

(43) Two hundred and thirty four doctors and lawyers

(44) a. *[234 \rightarrow UNITS] \not\approx [DOCTOR AND LAWYER]
     Units numbering 234 each, of doctor-lawyer;

b. [234 UNITS] \not\approx [DOCTOR AND LAWYER]
     Units numbering 234 together, of doctor-lawyer;

c. *[234 \rightarrow UNITS] \not\approx [DOCTOR AND LAWYER]
     Units numbering 234 each of doctor, and
     units numbering 234 each of lawyer;

d. ?[234 UNITS] \rightarrow [DOCTOR AND LAWYER]
     Units numbering 234 together of doctor, and
     units numbering 234 together of lawyer;

3. [234 UNITS] \sim [DOCTOR AND LAWYER]
     Units numbering 234 together of doctors and of lawyers.

That is, (43) may mean either "234 doctor-lawyers", as in (44b), "234 doctors or lawyers", as in (44e), and, perhaps, "234 doctors and 234 lawyers", as in (44d). However, for smaller numerals, as in (45), the acceptability of (46d) becomes even more questionable, and the acceptability of (46e) also decreases; thus, (46b) "three doctor-lawyers" remains the only class of interpretations uncontestably acceptable to all speakers of English:

(45) Three doctors and lawyers

(46) a. *[3 \rightarrow UNITS] \not\approx [DOCTOR AND LAWYER]
     Units numbering three each, of doctor-lawyer;

b. [3 UNITS] \not\approx [DOCTOR AND LAWYER]
     Units numbering three together, of doctor-lawyer;
c. *[3 \rightarrow UNITS] \not\subseteq [DOCTOR AND LAWYER]
Units numbering three each of doctor, and
units numbering three each of lawyer;

d. ??[3 \rightarrow UNITS] \rightarrow [DOCTOR AND LAWYER]
Units numbering three together of doctor, and
units numbering three together of lawyer;

e. ?[3 \rightarrow UNITS] \sim [DOCTOR AND LAWYER]
Units numbering three together of doctor and of lawyer.

Some speakers of English, however, do accept all three classes of
interpretations represented in (46b,d,e). 10

At this point, we may reanalyze example (25) three red and blue
flowers along the above lines, thereby capturing the similarity between
the judgements of (25), as reflected by the cross-linguistic survey
cited in the previous section, and the judgements of (45), as represented
in (46):

(47) a. *[3 \rightarrow UNITS] FLOWER \not\subseteq [RED AND BLUE]
b. [[3 \rightarrow UNITS] FLOWER \not\subseteq [RED AND BLUE] (=26a))
c. *[3 \rightarrow UNITS] FLOWER \not\subseteq [RED AND BLUE]
d. ??[[3 \rightarrow UNITS] FLOWER \rightarrow [RED AND BLUE] (=26b))
e. ?[[3 \rightarrow UNITS] FLOWER \sim [RED AND BLUE] (=26c))

The similar judgements exhibited in (46) and (47) provide further sup-
port for the unified analysis--in terms of scope relations--proposed
for (45), (25), and, of course, sentences such as (2). As is to be ex-
pected, if a larger numeral is substituted for three in (25), the ac-
ceptability of (47d,e) increases, by analogy to (46d,e) and (44d,e). 11

The above example suggests that our analysis may be extended to
conjunctions of expressions of arbitrary syntactic categories. As
argued in section 3.2.3, numeral phrases, e.g. three times, may also qualify verbs; moreover, in section 4.2.2 it was shown that verbs and verb phrases may also enter into relations of distributivity. Consider, now, the following VP:

(48) Sang and danced three times

In the above example, three times exhibits the same range of logical relations with respect to the verbal conjunction sang and danced, as three does with respect to the nominal conjunction doctors and lawyers—cf. (46). These may be represented as follows:

(49) a. *[3 \rightarrow \text{UNITS}] \not\approx [\text{SANG AND DANCED}]
Units numbering three each, of singing-dancing;

b. [3 \text{UNITS}] \not\approx [\text{SANG AND DANCED}]
Units numbering three together, of singing-dancing;

c. *[3 \rightarrow \text{UNITS}] \prec [\text{SANG AND DANCED}]
Units numbering three each of singing, and units numbering three each of dancing;

d. [3 \text{UNITS}] \rightarrow [\text{SANG AND DANCED}]
Units numbering three together of singing, and units numbering three together of dancing;

e. [3 \text{UNITS}] \sim [\text{SANG AND DANCED}]
Units numbering three together, of singing and of dancing.

Here, as in Turkish (42) above, the logical classifier constituent UNITS is overtly expressed—this time by the English classifier expression times, denoting a set of occasions or events. Interestingly, the logical relations represented in (49d,e) appear to be more readily available to speakers of English than the corresponding (47d,e): example (48) may accordingly be interpreted as "sang-danced three times"
as in (49b), "sang three times and danced three times" as in (49d), or, roughly, "either sang or danced a total of three times" as in (49e).

In this section, we have seen that numerals, or, more precisely, numeral phrases consisting of an overt numeral plus an overt or covert classifier constituent UNITS may enter into a variety of scope relations with their conjoined nominal (or other) heads. In particular, they may distribute externally over their heads—as in examples (44, 46, 49d). However, unlike adjectives such as tall or noisy, we found no instances of a numeral distributing over a classifier constituent UNITS—as would be the case were (44a,c), (46a,c) and (49a,c) acceptable. In the next chapter, however, we shall see that this is exactly what is the case for distributive numerals; thus, numerals (distributive or otherwise) in construction with conjoined nouns will exhibit all five classes of interpretations exemplified by noisy in (35). Distributive numerals will thus provide an explicit means of marking the phrase-internal relations of distributivity posited in the last two sections.

This concludes our study of the domains over which the relation of distributivity obtains. As we have seen, distributivity may hold between a variety of constituents at clausal and phrasal levels. In subsequent chapters, we shall see that distributive numerals may provide overt markings for distributivity wherever it may obtain.

4.3 The Syntax of Distributivity

After considering the semantic nature of distributivity and the domains over which it obtains, we now turn to study the ways in which it is expressed. In many, probably a majority of the instances in which distributivity occurs, it is reflected by no overt morpho-syntactic
marking; thus, in each of the following constructions, distributivity may (optionally) obtain, as indicated:

(50) a. [Two men] carried [three suitcases] (=8a)
b. [Three boys] ←→ [sang twice] (=17a)
c. [Noisy] ←→ [boys] (cf. (21c))
d. [Several] ←→ [doctors and lawyers] (cf. (41d))

However, languages possess a variety of overt morphosyntactic strategies which may be used to mark distributivity, which we shall now survey.

4.3.1 English each

We have already seen many examples of the use of each to mark distributivity; thus, for example, each can be employed to force the distributive interpretations of (50a,b) above—but not (50c,d):

(51) a. Two men carried three suitcases each (=1)
b. Three boys sang twice each
c. *Noisy each boys
d. *Several each doctors and lawyers

Much has been written about the syntax and semantics of each—e.g. Dougherty (1969, 1970), Hudson (1972), Lightfoot (1979), Postal (1974, 1976); an adequate description of each would itself be of dissertation scope. In this section we shall restrict ourselves to some observations which will be of immediate relevance to the study of distributive numerals.

Consider, to begin, the following sentences:
(52) a. Each of two men carried three suitcases
   b. Two men each carried three suitcases
   c. Two men carried three suitcases each  

Most scholars who have studied such constructions, e.g. Hudson (1970: 236), Postal (1976:167), argue that in (52b) each is an adverbial or adverbial-like expression, while in (52c) it is part of the direct object NP. Most commonly, e.g. Dougherty (1969, 1970), Postal (1974, 1976), Lightfoot (1979)—but not Hudson (1970), sentences such as (52b) and (52c) are argued to be transformationally derived from sentences such as (52a); Postal (1976:166-167) further distinguishes between two distinct transformations: "quantifier float", deriving (52b) from (52a), and "each-shift", deriving (52c) from (52a). Such transformational analyses are generally motivated by the synonymy of (52a-c), and by their formal similarity, differing, as they do, almost only in the position of the expression each. However, as we shall see in the continuation, constructions involving distributive numerals provide evidence against the need for transformations such as quantifier float and each-shift in universal grammar.

Turning, now, to a more detailed consideration of constructions such as (52b,c), we may note that if a (definite) demonstrative expression, e.g. these, is substituted for the (indefinite) numeral three, the adverbial each construction remains grammatical, but the construction in which each forms part of the direct object NP is rendered ungrammatical:

(53) a. Two men each carried these suitcases
   b. *Two men carried these suitcases each
(Similar examples are cited by Hudson 1970:233.) We may account for these facts by means of the following two assumptions: (a) each forces the (smallest) constituent to which it belongs to distribute over another constituent in the clause; and (b) each belongs to the VP in (52b) and (53a), and to the direct object NP in (52c) and (53b). Thus, while (53b) is ungrammatical since the direct object NP is definite and consequently cannot distribute over the subject NP, (53a) is grammatical, because, in (53a), it is the VP, not the direct object NP, that distributes over the subject NP—and the VP, unlike the direct object NP, is not constrained, by being definite, from distributing over another constituent. We may accordingly represent the relations of distributivity obtaining in (52b,c) as follows:

(54) a. [Two men]  [each carried three suitcases]
     b. [Two men] carried [three suitcases each]

Thus, in (54a), it is the VP that distributes over the subject NP, like in example (51b), and other constructions considered in section 4.2.2. Our analysis of sentences such as (52b) thus differs from that of Hudson and Postal, in that we take the expression each to be dominated by a verb-phrasal rather than a sentential node. Further support for this analysis will be provided in the next chapter, by constructions involving distributive numerals.

Let us now take a closer look at sentence (52b). Rather surprisingly, (52b) exhibits an interesting structural ambiguity, according to whether each is associated with the VP following it, as in (55a), or with the subject NP preceding it, as in (55b):
(55) a. Two men [each carried three suitcases]
   b. *[Two men each] carried three suitcases

Hitherto, in our discussion of sentence (52b), we have taken for granted the parsing indicated in (55a). This is, by far, the most readily available parsing; for many speakers of English, it is the only one. Some speakers of English, however, accept also the parsing indicated in (55b), in which the major syntactic (or intonational) break occurs after, rather than before the expression each. This parsing gives rise to a very different class of interpretations of sentence (52b), whereby the subject NP distributes over the direct object NP, and in which there were, accordingly, two men for each of the three suitcases—that is, a total of between two and six men. According to Hudson (1970:239) and Postal (1974:209), structures such as (55b) are ruled out by a constraint against the constituent containing postnominal each occurring to the left of the constituent distributed over; Postal (1974:218) also proposes a constraint against the occurrence of postnominal each within a subject NP. However, for speakers who accept (55b), these constraints are apparently inoperable. A similar structural ambiguity is exhibited also by the following sentence:

(56) Three boys each sang twice
   a. Three boys [each sang twice]
   b. *[Three boys each] sang twice

Whereas in (56a) each forces the VP to distribute over the subject NP (resulting in three boys and between two and six singing events), in (56b) each makes the subject NP distribute over the VP (resulting in two singing events and between three and six boys).
The various possibilities considered above regarding the semantic effect of *each* may be summarized as follows:

(57) a. [Two men] carried [three suitcases each] (direct object NP distributes over subject NP)

b. ?[Two men each] carried [three suitcases] (subject NP distributes over direct object NP)

c. [Two men] ← [each carried three suitcases] (VP distributes over subject NP)

d. [Three boys] ← [each sang twice] (VP distributes over subject NP)

e. ?[Three boys each] → [sang twice] (subject NP distributes over VP)

These data show that *each* readily combines with a direct object NP or a VP to make it distribute over a subject NP, and, less readily, with a subject NP to make it distribute over a direct object NP or a VP.

The above facts correlate in an interesting way with other facts pertaining to the acceptability of various distributivity relations in sentences without *each*. Recall that in sentence (2) Two men carried three suitcases, interpretations for which the direct object NP (or the VP) distribute over the subject NP are preferred over interpretations in which the subject NP distributes over the direct object NP (or the VP).

Similarly, in sentence (13) Three boys sang twice, interpretations in which the VP distributes over the subject NP are preferred over interpretations in which the subject NP distributes over the VP. Thus, perhaps somewhat surprisingly, the occurrence of *each* in (57) is favoured in those cases, (57a,c,d), where it forces a relation of distributivity that—if not for *each*—would have been preferred anyway, i.e.
distributivity over a subject NP. And the occurrence of each is disfavoured in those instances, (57b,e), where it forces a relation of distributivity that—if not for its use in (57)—would have been difficult to obtain, i.e. distributivity over a direct object NP or a VP. Rather than to increase the logical expressive power of English by forcing interpretations that would not be obtainable otherwise—as in (57b,e), each functions in an opposite way, to reinforce the acceptability of interpretations that are favoured anyhow—as in (57a,c,d). The occurrence of each thus correlates with the grammatical relations quantifier scope hierarchy, forcing relations of distributivity that are favoured by this hierarchy.

Similar facts would appear to obtain in other languages. Thus, corresponding to the universal grammatical relations quantifier scope hierarchy posited in Ioup (1975), Gil (1982a, to appear c) and elsewhere whereby subject NPs are more likely to have wider scope than other grammatical relations, other scholars, e.g. Keenan (1976:320), Postal (1976:168-169), have posited a hierarchy governing quantifier float according to which quantifiers are more likely to float off subjects than off other grammatical relations. Note that the effect of a floated quantifier is, very often, to force the quantifier’s "target" (to use transformational nomenclature) to distribute over its "source"; this is, in fact, one of the criteria according to which a quantifier is said to have floated. These two hierarchies may accordingly be viewed as two manifestations of a single grammatical relations hierarchy governing referential strength, whereby subject NPs are more strongly referential than other grammatical relations, e.g. direct object NPs, or VPs. In
the next chapter, we shall see that the occurrence and interpretation of constructions involving distributive numerals are also governed by this hierarchy.

4.3.2 Other Markers of Distributivity

Languages possess a variety of strategies for marking distributivity. One such strategy, distributive numerals, is what this dissertation is about; some alternative strategies are exemplified in (2) chapter 2—one of which, English each, was also discussed in more detail in the previous section. We shall now briefly survey the various other strategies languages employ for marking distributivity, in order to be in a better position to contrast these with distributive numerals, in subsequent chapters.

With respect to their lexical and morphosyntactic constitution, many, perhaps most markings of distributivity fall in to one of the following five categories: (a) universal quantifier; (b) universal quantifier plus numeral "one"; (c) universal quantifier plus classifier; (d) universal quantifier plus pronoun; and (e) numeral "one" plus classifier. These five categories all represent combinations of a universal quantifier (most frequently), the numeral "one", a classifier, and a pronoun.

Very common is the use of a universal quantifier to mark distributivity. Thus, for example, English each, shown in previous sections to force distributivity, is a universal quantifier occurring in constructions with a head noun, e.g. each boy. Other instances, exemplified in (2) chapter 2, are Georgian tito and Russian kazdiy. Further examples include:
(58) a. Fukian Chinese  
long  
"every"

b. Bikol  
kada  
"every"

c. Swedish  
var  
"every"

Very often, the universal quantifier occurs in construction with the numeral "one". Two examples of this appear in (2) chapter 2: Persian har yek, and Hebrew kol edad, both glossed as every one. Other examples include:

(59) a. Burushaski  
har hin  
"every one"

b. Bulgarian  
vseki edin  
"every one"

c. West Apache  
dalaʔa ntūgo  
"one every"

In some languages, the universal quantifier and the numeral have coalesced to various degrees, and the construction may perhaps no longer be synchronically analyzable in two parts:

(60) a. French  
chacun  
(from chaque "every" and un "one")

b. Rutulian  
harsa  
(from har "every" and sa "one")

c. Tamazight  
ku-yun  
(from ku "every" and yun "one")

A third type of construction marking distributivity involves a universal quantifier in construction with a classifier, often "person".
(61) a. **Vietnamese**
    mọi ngudi
    "every person"

b. **Dhu Luo**
    ngato ka ngato
    "person for person"

c. **Hebrew**
    iš iš
    "person person"

While in Vietnamese the universal quantifier has the form of a single
morpheme mọi, in Dhu Luo and Hebrew universal quantification is expressed
by reduplication of the classifier: in Hebrew, for example, iš iš is a
stylistically marked variant of kol iš "every man".

A fourth, related strategy for marking distributivity involves a
universal quantifier in construction with a pronoun. This strategy is
exemplified in (2) chapter 2 by Bura kóowani dù kwá dà "every from in
them".

Finally, distributivity may be marked by the numeral "one" in
construction with a classifier:

(62) a. **Hawaiian**
    a ke mea hoʻokahi
    "of the cl one"

b. **Batak**
    sa halak
    "one cl"

c. **English**
    apiece

While in Hawaiian and Batak the internal structure of the phrase is
transparent, English apiece is perhaps only diachronically analyzable as
consisting of a reduced numeral form a plus a classifier expression piece.

From what information is available, it would appear that most of
the markers of distributivity discussed in the previous pages exhibit
similar syntactic and semantic behaviour to English each; that is, they occur within either VPs (i.e. adverbially) or NPs, forcing the constituents they occur in to distribute over another constituent in the clause. More generally, it is possible to distinguish, as was done for numerals in section 3.2.2, between (a) markings of distributivity in construction with nouns; (b) adverbial markings of distributivity; and (c) markings of distributivity in construction with verbs. All of the preceding examples belong to the first two categories. In some languages, however, distributivity may be marked on the verb; we shall now consider a number of examples.

Two instances of verbal affixes marking distributivity are exemplified in (2) chapter 2; these are the Batak prefix marsi- and the Maricopa suffix -xper. Unlike their nominal and adverbial counterparts considered above, verbal markers of distributivity are not usually analyzable in terms of other logical operators, e.g. the universal quantifier, or the numeral "one"—but, instead, are typically morphologically primitive. In general, when markers of distributivity occur on transitive verbal phrases, they make the direct object NP distribute over the subject NP, and not vice versa. Their occurrence and interpretation is thus governed by the same grammatical relations hierarchy that was argued in the previous section to govern the occurrence of English each. Quite often, grammatical descriptions identify verbal distributivity markers with plural object markers—to the extent that it is sometimes no longer clear whether a distinction between the two can be maintained. This is the case, for example, in Illongo (Wolfenden 1971: 130-131), Pangasinan (Benton 1971:132), Nubian (Armbruster 1960:375), and Eastern Fomo (McLendon 1975:73-77).
A rather different situation would appear, however, to obtain in Kiawai. (The following data are from Capell 1965:458, 1969:73-74; however, the analysis is my own.) As noted in section 3.2.2, verbal stems in Kiawai, e.g. odo "sg-obj-pick", ido "pl-obj-pick", may be numerically modified, e.g. by suffixes -ama "two:obj", -bi "three:obj". Kiawai also has two verbal suffixes indicating multiplicity of actors, -uti and -?o, which are of particular interest to us. The suffixes -uti and -?o differ with respect to the scope relation forced between the verb and the direct object: -uti forces a weak symmetric relation, while -?o forces the direct object to distribute over the verb. The following examples and glosses provided by Capell give some indication of how this works:

(63) a. odouti
    "pick one, the action of picking requiring a number of successive efforts at tugging"

    b. idouti
    "pick several in successive actions (the entire action of picking is thought of as subdivided into the individual actions of picking one at a time)"

(64) a. odo?o
    "go on picking one at a time"

    b. ido?o
    "go on picking several at a time"

    c. ido?oama
    "go on picking two at a time"

    d. ido?obi
    "go on picking three at a time"

Thus, for example, in (64b), the suffix -?o, in addition to signifying a plurality of actions, forces the (understood) direct object denoting,
say, pieces of fruit, to distribute over the verb; hence, for each ac-
tion of picking, there are several pieces of fruit picked. (In contra-
distinction, the suffix -uti in (63b), while also signifying a plurality
of actions, entails a weak symmetric scope relation between the actions
of picking and the fruit picked, where only one was picked at a time.)
Similarly, in (64d), -ʔo forces a direct object denoting, say, three
pieces of fruit, to distribute over the verb, resulting in three pieces
of fruit being picked at a time. Thus, Kiwai -ʔo is like most verbal
markers of distributivity (e.g. Batak marṣi-, Maricopa -xper) in that
it forces a direct object NP to distribute over another constituent;
however, it differs from most such markers in that it forces the direct
object NP to distribute over the verb, rather than over the subject NP.

To the best of my knowledge, no extensive theoretical study has
yet been made of verbal markers of distributivity. No doubt, this is
due, at least in part, to their occurrence among less well studied
language families, primarily in Oceania and the Americas. This is a
lacuna crying out to be filled. A contribution towards the study of
verbal distributivity markers is offered in chapter 8, where a detailed
analysis of Maricopa -xper is provided.

To conclude our survey of the ways in which languages mark
distributivity, we note that frequently, alternative strategies for ex-
pressing distributivity are combined. For example, in Batak sentence
(2c) chapter 2, the verbal prefix marṣi- cooccurs obligatorily with a
morpheme be within the NP. In the following Batak sentence, the above
two markers of distributivity cooccur with a third marker, the adverbial
sa halak mentioned in (62b):
(65) Marsibaen jabu na tolu be sa halak dua ama-ama
dist-built house link three dist one cl two man
"Two men built three houses each"

In (65), distributivity is marked across the clause—on the verb, ad-
verbially, and on the direct object NP. (This is somewhat reminiscent
of the way in which negation spreads across clauses, in Black English
and many other languages—cf. Labov (1973) and Horn (1978:171-172), who
cites Shakespeare's I will not budge for no man.) As we shall see in
subsequent chapters, the various markers of distributivity discussed in
this section frequently cooccur also with distributive numerals.

In the last two chapters we have studied the syntax and semantics
of numerals and distributivity, thereby laying the groundwork for an
analysis of the construction type combining them both—namely, distribu-
tive numerals. To this analysis we now turn.
Footnotes - Chapter 4

1 More complex examples can be constructed by allowing the suitcases to overlap partially but not completely. Consider, for example, a state of affairs where \( m_1 \) carried \( s_1' \), \( s_2' \), \( s_3' \), and \( m_2 \) carried \( s_4' \), \( s_5' \); moreover, \( m_1 \) and \( m_2 \) cooperated in the carrying of \( s_3' \). Arguably, such a state of affairs is an interpretation of sentence (2); clearly, for this state of affairs two men > three suitcases but two men is not interpreted individually.

2 For example, if three suitcases were to *distribute over two men, three suitcases would be in the scope of two men and would be interpreted individually, while two men could be interpreted either individually or collectively. Thus, in the state of affairs described in footnote 1 above, three suitcases may *distribute over two men (if the suitcases are acted upon individually), but may not distribute over it (since the two men cooperated to carry one of the suitcases).

3 Technically, the relations of distributivity indicated in (8a) and (8b) render three and two, respectively, distributive numerals. We shall reserve the use of the term distributive numeral, however, for those numerals which, in addition to being interpreted distributively, also exhibit a non-null morphosyntactic marking of distributivity.

4 In the above examples, and in subsequent ones, we appeal to an intuitive understanding of the individual/collective distinction, without attempting to define it more precisely. For some of the problems and pitfalls inherent in any attempt to formalize precise criteria see Hudson (1970:206-217). In some instances, it is quite clear when an expression is being interpreted collectively; this is the case when an expected entailment fails. Thus, for example, while John and Bill slept entails John slept, John and Bill assembled does not entail John assembled; consequently, John and Bill is interpreted collectively in the latter example. However, it would seem that failure of entailment is a sufficient but not necessary condition for an expression to be interpreted collectively. Thus, I photographed John and Bill may entail I photographed John, even if John and Bill is interpreted collectively in the former sentence, i.e. if the action of photography applied to them together, as a single whole.

5 Thus, from a random sample of six speakers of English, all six obtained (26a), two accepted (26c), and only one approved of (26b). Most other languages exhibit a similar pattern. In some languages, however, interpretations (26b) and (26c) appear to be more readily available. For example, two speakers of Inunhan—a Philippine language—asked to judge (i) below both accepted (26a) and (26c), and one of the two also accepted (26b):

(i) Ang tatlong pula kag asol nga bulak


top three-lig red and blue lig flower

97
A somewhat different pattern is presented by Buginese. Two speakers asked to judge (ii) both accepted (26a) and (26b), while none accepted (26c):

(ii) Tellu bunga warna merajambu sibawa ungu

three flower colour red and blue

The Inunhan and Buginese facts are perhaps indicative of a certain degree of cross-linguistic variation in the interpretation of NPs such as (25). It is interesting to observe that the acceptability of class (25b) of asymmetric interpretations in Buginese accords well with the high degree of acceptability of asymmetric scope relations between NPs in a clause reported upon in Gil (to appear c). Buginese thus exhibits an across the board predilection for asymmetric scope relations, be they clausal, or, as in (ii) above, phrase-internal. In this property, Buginese differs from most other languages, which—as argued in Gil (to appear b)—disfavour asymmetric scope interpretations.

Some support for the existence of scope relations within conjunctions is provided, in chapter 8, by Maricopa, in which conjoining verbs may occur with an overt marker of distributivity.

However, even in the case of English and most other languages, there is nothing at all strange about positing a scope relation between an overtly expressed constituent and an understood one. For example, in the imperative Eat ten apples each, ten apples each distributes over a covert addressee phrase. Similarly, ten apples each may itself constitute a complete utterance, in response, say, to an understood or overt question How many apples did they eat?

Our analysis of the ambiguity of doctors and lawyers has interesting philosophical ramifications. It would appear to support a model-theoretical approach to semantics suggested by Montague (1970, 1973) and subsequently developed by Keenan and Faltz (1978, 1980) and others, based on an ordered pair <2, U>, where U is a nomienen world of "things that exist". To wit, the nomienen elements in the universe of discourse are the UNITS, which may occur in constructions with properties, e.g. DOCTOR, and—as in the above example—also enter into scope relations with them. In the next section, it is suggested that these elements may sometimes be overtly expressed, in the form of numeral classifiers. Our analysis thus runs counter to Keenan's (1981, 1982a) recent attempts at ontological simplification, supporting instead a more lavish ontology based upon an underlying world U of entities.

Of course, internal and external distributivity may also obtain between clausal constituents, as for example:

(i) The doctors and the lawyers are noisy

Note that for external distributivity, each conjunct in the expression distributed over is interpreted collectively. As a result, while (ii/a) and (ii/b) are ungrammatical, in (ii/c) each may cooccur with a predicate forcing a collective interpretation on its head; in (iii/c) each forces external distributivity and each conjunct is interpreted collectively.
(ii) a. *John and Mary each assembled
    b. *The men each assembled
    c. The men and the women each assembled

In other constructions, each may induce either external or internal distributivity:

(iii) Two men and three women carried ten suitcases each
    a. **External Distributivity**
       Two men carried ten suitcases between them, and
       three women carried ten suitcases between them;
    b. **Internal Distributivity**
       Two men carried ten suitcases each, and three
       women carried ten suitcases each.

Interpretations (41d) and (41e) of (40) provide counterexamples to the property of conservativity suggested by Keenan and Stavi (to appear) to characterize all determiners. If X is a boolean algebra and P(X) its power-set algebra, a function f from X to P(X) is conservative if and only if for any \( x_1, x_2 \in X, x_1 \neq x_2 \), \( f(x_1) \) if and only if

\[
(x_1 \land x_2) \in f(x_1) \]

What conservativity says is that the interpretation of a phrase such as several doctors and lawyers depends on those individuals who have the "doctor and lawyer" property and not on those individuals who do not. Keenan and Stavi observe that constructions such as (40) violate conservativity, in that their interpretation depends not only on those individuals with the "doctor and lawyer", i.e. "doctor-lawyer" property, but also, on those individuals with the "doctor" property alone, and the "lawyer" property alone; they then suggest modifying the logical type for the determiners in order to accommodate such counterexamples. According to our analysis, however, the violations of conservativity in (41d), (41e), and their like, result from a different type of violation, the existence of scope relations between the nominal phrase and the conjoined nouns. Our approach would thus appear to offer a better-motivated account of the violations of conservativity than the solution proposed by Keenan and Stavi themselves.

Note that the conservative interpretations of determiners are those in which a strong symmetric scope relation obtains between the determiner and its nominal head. The viability of the Keenan-Stavi characterization of determiners as conservative (notwithstanding the above counterexamples) is thus a direct consequence of the more general preference for strong symmetric scope relations between constituents--as documented in Gil (to appear b) and further supported in this chapter.

However, since numeral classifiers do not normally cooccur with adjectives, they offer no corresponding support for our analysis of adjectival constructions, as in (35). Thus, for example, tane cannot occur in the Turkish translation of (34):

(i) *Gürültücü tane doktor ve avukatlar
    noisy unit doctor and lawyers

99
It is worth noting, however, Greenberg's (1978b) proposal that numeral classifiers constitute a probable diachronic source for nominal gender systems. This suggests that the constituent UNITS may also surface as a gender marking, e.g. the masculine (and plural) suffix -im on the adjective рааšani "noisy" in the Hebrew translation of (34):

(ii) Roffim upraklitim raаšaniim
doctors and-lawyers noisy-plm

10 Interestingly, the classes of interpretations corresponding to (44d,e) and (46d,e) appear more readily accessible for the sentential counterparts of (43) and (45)

(i) a. The doctors and the lawyers number three
   b. The doctors and the lawyers number two hundred and thirty-four

Again, as in (ii/c) in footnote 7, external distributivity may be forced with each:

(ii) a. The doctors and the lawyers number three each
   b. The doctors and the lawyers number two hundred and thirty-four each

In light of (ii) above, we would perhaps like to construct phrases in English such as Three each doctors and lawyers, meaning "three doctors and three lawyers", or "doctors and lawyers numbering three each". Unfortunately, English does not permit this. However, as we shall see in the next chapter, such constructions are possible with distributive numerals.

11 Example (47) suggests that we might go back to (34) noisy
doctors and lawyers, in order to reanalyze it in terms of a logical form containing a covert numerical qualifying constituent SEVERAL, as in (i/a) or (i/b):

(i) a. [[SEVERAL UNITS] NOISY] [DOCTOR AND LAWYER]
   b. [[SEVERAL UNITS] [DOCTOR AND LAWYER]] NOISY

Although one of the above analyses is probably more appropriate than that provided for (34) in (35), we shall not pursue this any further, as it would lead us astray from questions of more immediate concern.

12 It is also the case that conjoined numerals can enter into a variety of scope relations with their nominal heads. Constructions involving boolean combinations of numerals, e.g. three or four, at least three and/or not more than six, are discussed in detail by Cushing (1977), Barwise and Cooper (1981), and Keenan and Stavi (to appear). Consider, now, the following:

(i) Three and five boys

The above example possesses, potentially, the following three classes of interpretations:
(ii) a. \([3 \text{ AND } 5] \rightarrow \text{UNITS} \] BOY
Units numbering three and five each, of boy;
b. \([3 \text{ AND } 5] \sim \text{UNITS} \] BOY
Units numbering three and five together, of boy;
c. \([3 \text{ AND } 5] \succ \text{UNITS} \] BOY
Units numbering three together and units numbering five together, of boy.

Class (ii/a) of interpretations is in general unacceptable; though, as we shall see in subsequent chapters, it is acceptable for adnominal distributive numerals. Class (ii/b) of interpretations stipulates the existence of a single set of boys numbering three and also five: while this is gibberish for an ordinary speaker of English, logicians interpreting the numerals as increasing will take it to mean, simply, "five boys". The ordinary speaker of English may, however, easily obtain the analogous class of interpretations for, say, at least three and/but not more than six boys, meaning that the same set of boys numbers at least three and, also, not more than six. This is the class of interpretations that is accounted for by Barwise and Cooper (1981) and Keenan and Stavi (to appear).

However, a third class of interpretations is also available, as indicated in (ii/c). This class of interpretations stipulates the existence of a set of boys numbering three, and another set of boys numbering five—-that is, a total of eight boys. While for phrase (i) class (ii/c) of interpretations is somewhat bizarre, for other numerals it is much more readily acceptable. Thus, for example, Stampe (1977: 594-595) points out that expressions such as three hundred and sixty five may be interpreted either as a single complex word denoting a particular number (365), or—in analogy with (ii/c)—as a conjunction of two numerals denoting two numbers (300 and 65 respectively). While in English three hundred and sixty five is normally interpreted as a single numeral, in other languages similar expressions may be interpreted more readily in analogy with (ii/c). Evidence for this is provided by constructions—observed by Hurford (1975:175-192)—in which a nominal head "distributes into" the complex numeral phrase, occurring after each one of the conjuncts, rather than just once, following the entire phrase. In the following examples, the head noun "year" occurs after each of two numerical conjuncts in Biblical Hebrew, and each of these conjuncts in Biblical Welsh:

(iii) a. Biblical Hebrew
\[
\text{taš mepoθ Šōnōh wəhāmîšśim Šōnōh}
nine hundreds year and-fifty year
\]
b. Biblical Welsh (Hurford 1975:176)
\[
\text{naω cæn mlynedd a deng mlynedd a dengain mlynedd}
nine hundred years and ten years and forty years
\]
"Nine hundred and fifty years" (Genesis 9:29)

Examples such as the above show that the complex members of the cardinal numeral series (e.g. three hundred and sixty five, nine hundred and fifty) arise out of a particular scope relation—-that represented in (ii/c)—-obtaining between a conjoined numeral phrase and its nominal head.
The syntax of such constructions would, in itself, merit an extensive investigation. Particularly advantageous would seem to be a diachronic perspective. Thus, for example, Hebrew (i/b), in which kol eḥad "every one" is apparently part of the direct object NP, is most likely derived from (i/a), in which kol eḥad is a subject NP, the verb is singular, and נסני חַבְּרָנָאָשִים is a (definite) topic phrase:

(i) a. נסני חַבְּרָנָאָשִים, kol eḥad nasaš mizvadot
two-m-f the-men every one-m carried-3sg three-f suitcases

b. נסני חַבְּרָנָאָשִים, kol eḥad
two-m men carried-3pl three-f suitcases every one-m

(=2e) chapter 2

The attachment of a distributivity marker to an NP is a potential source for the development of distributive numerals. Thus, in the following Bicol sentence, kada "every" occurs within the NP, between the case marking preposition ning and the numeral tulong:

(ii) Nangdara ning kada tulong maleta su duang lalaki
carried-AT dir every three-lig suitcase top two man

Were kada to form a constituent with tulong, the resulting expression would, perforce, be an adnominal distributive numeral. In section 6.5.3, it is suggested that such a development may have already occurred in Tagalog, with bawat "every".

The case of Batak marsi- is rather curious, in that although it conforms to this hierarchy, quantifier scope in Batak—as documented in Gil (to appear c)—does not, being governed instead by a thematic relations hierarchy. I have no explanation for this discrepancy.
Chapter 5

5. **Distributive Numerals: An Analysis**

In order to account for the syntax and semantics of constructions involving distributive numerals, we shall suggest that expressions containing distributive numerals may distribute over a variety of constituents within clauses and phrases. Specifically, we shall distinguish between the following four cases: (a) an expression containing a distributive numeral distributing clausally over an NP; (b) an expression containing a distributive numeral distributing clausally over a verbal phrase; (c) a distributive numeral distributing phrasally over its head, namely, a classifier constituent UNITS; and (d) an expression containing a distributive numeral distributing phrasally over a conjunction. Cases (a), (b), and (c) will be argued to account for classes A, B, and C, of interpretations presented in section 2.3.3, while case (d) will be suggested to underly the semantics of constructions involving external distributivity, as discussed in sections 4.2.3 and 4.2.4. In this chapter, we shall provide analyses for adnominal distributive numerals, adverbial distributive numerals, and distributive numerals qualifying verbs, respectively.

5.1 **Adnominal Distributive Numerals**

Let us now consider in greater detail the semantics of the sentences involving adnominal distributive numerals presented in (1) chapter 2; some of these sentences are reproduced below:
(1) a. **Tagalog** (=la) chapter 2

Dinala ng dalawang lalaki ang tigtatlong maleta
carried-PT dir two-loc man top dist-three-loc suitcase

b. **Georgian** (=lc) chapter 2

Orma k'acma sam-sami čanta c'airo
two-erg man-erg three-dist-nom suitcase-nom carried-3sg
c. **Turkish** (=ld) chapter 2

Iki adam üçer bavul taşidi	
two man three-dist suitcase carried
d. **Rumanian** (=lf) chapter 2

Doi oameni au cărat câte trei valize.
two men have-3sg carried dist three suitcases
e. **Bura** (=lh) chapter 2

Mjí sudá kétá pàntimótá máamákør
men two took suitcase dist-three
f. **Maricopa** (=lj) chapter 2

?ipác xvikk ?ii xmokxpern paayšík
men-nom 3-two-sg-ss stick 3-three-sg-dist-ds 3-carried-dual-
real

As noted in section 2.3.3, the above sentences may receive one or
more of the three classes of interpretations specified in (4) chapter 2,
roughly paraphrasable in the following English constructions:

(2) a. **Class A** (=5) chapter 2

Two men carried three suitcases each

b. **Class B**

Two men carried the suitcases three at a time
c. **Class C**

Two men carried sets of three suitcases
Clearly, for class A interpretations, the NP containing the distributive numeral distributes over the other NP in the clause, as indicated below:

(3) [TWO MEN] CARRIED [3-DIST SUITCASES]

But what of classes B and C of interpretations? Consider, for example, the Turkish adnominal distributive numeral üçer in (1c). Are there (as queried before, in 2.3.3) three logically distinct but homophonous forms üçer, one, a distributive numeral glossed as "three each", the other two, numerals of some other kind, glossed, respectively, as "three at a time" and "sets of three"? Such a conclusion, however, clearly misses out on some important generalizations. Why should the sentences in (1) receive classes A, B, and C of interpretations, and not, instead or as well, a variety of other conceivable classes of interpretations? And why should the pattern presented by Turkish üçer recur in language after language—for example, with Rumanian câte trei and Bura măamăciar?

Clearly, some form of unified analysis of the variety of possible interpretations received by constructions involving distributive numerals is desirable. We shall now provide such an analysis.

5.1.1 Clausal and Phrasal Distributivity

We shall argue that Turkish üçer represents not three logically distinct but homophonous forms, but, instead, a single logically well-defined form—appropriately referred to as an adnominal distributive numeral. The variety of glosses attributable to üçer—"three each", "three at a time", "sets of three"—result from üçer and/or the expression containing it distributing, respectively, over another NP in the clause (for class A interpretations), another verbal phrase in the
clause (for class B interpretations), and phrase-internally, over its head (for class C interpretations). Analogous analyses of course obtain for adnominal distributive numerals in other languages, such as Rumanian cite trei and Bura mamăskăr.

5.1.1.1 Clausal Distributivity Over Verb

Class B interpretations may be accounted for by assuming that the NP containing the distributive numeral distributes over a verbal phrase, or, more precisely, over a generally covert constituent numerically qualifying the verb—specifying the number of events involved:

(5) 2 MEN [[SEVERAL UNITS] CARRIED] [3-DIST SUITCASE]

In section 3.2.3 it was argued that verbs could be semantically plural, and, optionally, numerically qualified. In section 4.2.4 it was further suggested that numerical expressions qualifying verbs may be logically represented in terms of a numeral in construction with a classifier, e.g. 3 UNITS; this is supported by the existence of expressions such as three times, where both components of 3 UNITS are overtly expressed. Example (5) above suggests that a (possibly covert) numeral plus classifier constituent underlies all occurrences of verbal expressions in a sentence, and not just those in which a verb is overtly qualified by a numeral phrase.

According to (5), the NP containing the adnominal distributive numeral distributes over the numeral plus classifier constituent qualifying the verb. That is to say, for every carrying event there were three suitcases: the suitcases were carried three at a time. In chapter 4 we observed several instances of expressions distributing over verbs;
for example (18b) sang twice ← ten arias (sang ten arias each of
two times), (49d) sang and danced ← three times (sang three times
and danced three times), and (64d) Kiwai ido?obi (pick three each time).
As indicated by (5), a similar relation of distributivity is also re-
ponsible for class B of interpretations of sentences such as (1)
containing adnominal distributive numerals.

5.1.1.2 Phrasal Distributivity Over Head

Class C interpretations may be accounted for by assuming that the
distributive numeral distributes over its head, namely, a (covert or
overt) classifier constituent:

(6) 2 MEN CARRIED [[3-DIST → UNITS] SUITCASE]

Whereas in section 4.2.3 it was shown that adjectives may allow either
distributive or collective interpretations of their heads, e.g. (21c)
noisy boyz, heavy suitcases, etc., in section 4.2.4 it was argued that
numerals force collective interpretations on their heads. However,
class C interpretations of constructions with distributive numerals
attest to the possibility that numerals, too, may allow individual
interpretations of their heads—and, in fact, may distribute over them.
Thus, corresponding to the two classes of interpretations of an
adjective-noun construction in (7) are the two classes of interpretations
of a numeral-noun construction indicated in (8):

(7) Heavy suitcases

a. [HEAVY UNITS] SUITCASE
   Collectively heavy (units of) suitcase;

b. [HEAVY → UNITS] SUITCASE
   Individually heavy (units of) suitcase.
(8) üç(-er) bavul "three(-dist) suitcase"

a. [3 UNITS] SUITCASE
   Units numbering three together, of suitcase;

b. [3-DIST → UNITS] SUITCASE
   Units numbering three each, of suitcase.

While in (7a) and (8a) the suitcases are interpreted collectively—the entire set, as a whole, being heavy or numbering three, in (7b) and (8b) the suitcases are interpreted individually—each unit of suitcase being heavy or numbering three. Thus, the adnominal distributive numeral 3-DIST distributes over UNITS in (8b) just as the adjective HEAVY distributes over UNITS in (7b).

Note that the NP meaning represented in (8b) contains both of the constituents between which distributivity obtains. Expressions such as Turkish üçer bavul, Rumanian cîte trei valize, and Bura pântîmîotă măamăakăr, are thus—for class C interpretations at least—complete expressions, and not elliptical, as is the English three suitcases each, which entails distributivity over another NP, either understood or present in previous discourse. For example, if asked to name with a single NP the contents of a picture portraying several sets of three suitcases, a Turkish speaker might offer üçer bavul; however, a speaker of English would require a somewhat more complex paraphrase, such as sets of three suitcases, suitcases (arranged) in threes, etc.

Finally, note that whereas in many languages the head over which the distributive numeral distributes is a covert constituent posited for logical form, in languages with numeral classifiers, the distributive numeral's head may be an overt classifier expression. Thus, for example,
(8a,b) may be realized in Turkish as (9a,b), where—in the second example—the distributive numeral üçer distributes over the classifier expression tane:

(9) a. [üz tane] bavul
    b. [üzer tane] bavul

3.1.1.3 Discussion

We have thus proposed a unified analysis of classes A, B, and C of interpretations of sentences such as (1) containing adnominal distributive numerals. All three classes of interpretations result from a relation of distributivity induced by the distributive numeral; in that sense, it is the "same" distributive numerals üçer, cite trei, maimakér, etc. (and not logically distinct but homophonous forms) that are responsible for classes A, B, and C of interpretations. The differences between the three classes are due merely to the different domains over which distributivity obtains. Thus, class A interpretations (e.g. "three each") result from the NP in which the distributive numeral occurs distributing over another NP in the clause, class B interpretations (e.g. "three at a time") result from the NP in which the distributive numeral occurs distributing over another verbal phrase in the clause, and class C interpretations (e.g. "sets of three suitcase") result from the distributive numeral distributing phrase-internally over its head.² Our analysis of the three classes of interpretations may be summarized as follows:³

(10) a. Class A

    \[\begin{array}{c}
    [[2 \text{ UNITS}] \text{ MAN} [[[S \text{ UNITS}] \text{ CARRIED} ][[3-\text{DIST } \text{ UNITS} ] \text{ SUITCASE} ]
    \end{array}\]
b. **Class B**

[[2 UNITS] MAN][[S UNITS] CARRIED][[3-DIST → UNITS] SUITCASE]

c. **Class C**

[[2 UNITS] MAN][[S UNITS] CARRIED][[3-DIST → UNITS] SUITCASE]

We shall now present a number of arguments in favour of the above analysis.

To begin, we may note that the above account of constructions involving distributive numerals parallels in an interesting way the analysis—proposed in chapter 4—of sentences without overt markers of distributivity, e.g. (2) **Two men carried three suitcases:**

(11) a. [Two men] carried [three suitcases] (=8a) chapter 4

b. [Two men] carried [three suitcases] (=8b) chapter 4

Just as the variety of possible interpretations of sentences such as **Two men carried three suitcases** results from alternative relations of distributivity—as indicated in (11a) and (11b), so the three classes of interpretations of the sentences in (1) are the product of different relations of distributivity obtaining as per (10a), (10b), and (10c) above. Moreover, just as the interpretations of sentences such as (11) are subject to a significant degree of idiolectal, dialectal, and cross-linguistic variation—as reported in Gil (to appear b), so speakers of different idiolects, dialects, and languages offer conflicting judgements of sentences such as (1) with respect to classes A, B, and C of interpretations. This parallel offers prima facie support for our making use, as in (10) above, of the same semantic mechanism—namely, distributivity, obtaining between different constituents—in order to account not only for the semantics of ordinary sentences as in (11),
but, also, the variegated semantics—involving multiple ambiguities and linguistic variation—of constructions containing distributive numerals, like those in (1).

The parallel between the more "usual" instances of distributivity, as exemplified in (11), and those argued in (10) to underly the semantics of distributive numerals, is underscored by certain constructions involving adverbial markers of distributivity, e.g. English each. Consider, for example, the following sentence:

(12) The men gave the boys three books each

In (12), each may cause the NP containing it to distribute either over the boys—in which case each boy received three books, or over the men—in which case each man gave three books. (Similar examples are provided by Hudson 1970:242 and Postal 1974:207-208.) These two possibilities may be represented as follows:

(13) a. [THE MEN] GAVE [THE BOYS] [3 BOOKS EACH]

b. [THE MEN] GAVE [THE BOYS] [3 BOOKS EACH]

As indicated above, each may induce relations of distributivity between different NPs, thereby rendering the sentence in which it occurs ambiguous. Presumably, no linguist would propose, to account for the semantics of (12), two logically distinct but homophonous forms each, one inducing distributivity over an object NP, the other inducing distributivity over a subject NP. The analysis of each in (13) provides strong support for the parallel analysis of distributive numerals summarized in (10). To wit, just as each may induce various relations of distributivity rendering sentences such as (12) ambiguous, so adnominal distributive
Numerals may force a variety of relations of distributivity in sentences such as (1), resulting in interpretations of classes A, B, and C. Thus, like each, adnominal distributive numerals such as üger are in and of themselves unambiguous; however, both may cause the construction in which they occur, e.g. (1) and (10), to exhibit structural ambiguity with respect to the domain over which distributivity obtains.\(^4\)

Further evidence in favour of our analysis of distributive numerals may be derived from consideration of constructions differing from (1) with respect to the plurality of the agent NP or the verbal phrase. First, note that for class A interpretations to be available, the NP distributed over must be semantically plural. Recalling, now, from section 2.3.3, that in sentences with adverbal or verbal markers of distributivity only class A interpretations are available, it is not surprising that if the NP distributed over is changed from a plural—as in (2) chapter 2—to a singular—as below—the resulting sentences are ungrammatical:

\[(14)\]

\[\begin{align*}
\text{(a) & English} & \text{(cf. (2a) chapter 2)} \\
& \text{*One man carried three suitcases each} \\
\text{(b) & Maricopa} & \text{(cf. (2j) chapter 2)} \\
& *?ipasion $\text{sentik} \ 7ii \ xmokm \ paayxperk} \\
& \text{man-nom 3-one-sg-ss stick 3-three-sg-ds 3-carried-sg-real}
\end{align*}\]

Observe, however, that in (10b,c) the constituent 2 UNITS MAN is not distributed over; there is, accordingly, no need for it to be plural. Our analysis of classes B and C of interpretations accordingly predicts that sentences corresponding to (14) but with adnominal distributive numerals will, contra (14), be grammatical. The following sentences,
derived from (1) by changing the agent NP from plural to singular, provide some support for this prediction:

(15) a. **Tagalog**
    Dinala ng isang lalaki ang tigtatlong maleta
carried-PT dir one-lig man top dist-three-lig suitcase

b. **Georgian**
    Ertma k'acma sam-sami chant c'aiyo
one-erg man-erg three-dist-nom suitcase-nom carried-3sg
c. **Turkish**
    Bir adam üçer bavul taşidi
one man three-dist suitcase carried
d. **Rumanian**
    Un om a cărat cîte trei valize
one man have-3sg carried dist three suitcases
e. **Bura**
    Mă dükun kötä pântimotă mâamâkār
man one took suitcase dist-three
f. **Maricopa**
    ?ipas šentik ?ii xmokxperm paayk
man-nom 3-one-ss stick 3-three-ss-dist-ds 3-carried-ss-real

Speakers offer conflicting judgements with respect to sentences such as the above, some speakers accepting them as grammatical, but others rejecting them as ill-formed. (Of those speakers I consulted, one speaker each of Bura and Maricopa, and one out of two speakers of Georgian, judged the appropriate sentences to be grammatical, while one speaker each of Turkish and Rumanian, one out of two speakers of Georgian, and two out of two speakers of Tagalog judged the appropriate
sentences to be ungrammatical.) The speakers who accepted the appropriate sentences provided them, as expected, with class B glosses (e.g. "One man carried the suitcases three at a time") and/or class C glosses (e.g. "One man carried sets of three suitcases").

It is unclear whether the above variation in judgements is idiolectal, cross-linguistic, or—as is quite likely—a little bit of both. Nevertheless, it is still possible, while holding the above question in abeyance, to draw conclusions from the responses of each of the two groups of speakers. To begin, those speakers who judge the sentences in (15) to be grammatical provide clear support for our analysis of classes B and C of interpretations; for these speakers, distributivity may obtain between the patient NP and the verb (as in (10b)) and/or within the patient NP (as in (10c))—hence the grammaticality of the appropriate construction in (15) is not affected by extraneous factors such as the number of the agent NP. As for those speakers who judge the sentences in (15) to be ungrammatical, it would seem, prima facie, to be the case that they only allow distributivity between two NPs (as in (10a))—the singular NP in (15) preventing distributivity from obtaining and consequently rendering the sentences ungrammatical. However, for at least one of the speakers consulted, it is the number of the verb, rather than of the agent NP, that prevents distributivity: while Romanian (15d)—reproduced below as (16a)—is judged ungrammatical, changing the aspect of the verb from perfective to progressive, as in (16b), makes the construction grammatical:

(16) a. *Un om a câștigat cîte trei valize
    one man have-3sg carried dist three suitcases
b. Un om căra  căte trei valize
one man carries-3sg dist three suitcases

The above data from Rumanian indicate clearly that in (16b) the patient NP căte trei valize distributes over the verbal phrase căra, in analogy to (10b). In doing so, they highlight the parallel between verbal and nominal phrases, in that the semantically singular verbal phrase a cărat blocks distributivity in (16a) just as the semantically singular noun phrase one man blocks distributivity in (14a). (In section 5.2 we shall see more examples of verbal aspects blocking distributivity in English.) However, with regard to the speakers of other languages who judge the sentences in (15) to be ungrammatical, it is unclear whether the agent NP or the verbal phrase are responsible for blocking distributivity; all that can be said for such speakers is that they allow (one or another form of) clausal distributivity, as in (10a,b), but not phrasal distributivity, as in (10c).

Note that with respect to most of the relevant semantic parameters (number of men, events, and suitcases, and individual vs. collective action of the men), class C of interpretations of sentences such as (1) contains classes A and B of interpretations. This suggests that all interpretations of constructions involving distributive numerals could be accounted for by means of phrasal distributivity, as in, say, (10c), without recourse to clausal distributivity, as in, say, (10a,b). However, there are several good reasons to believe that adnominal distributive numerals may induce both phrasal and clausal distributivity. For example, as we saw above, Rumanian provides straightforward evidence for clausal distributivity over verbs. As for clausal distributivity over

115
NPs, evidence in favour of this is provided by constructions involving restrictive distributive numeral phrases (cf. section 3.1.2). The following sentences are derived from the corresponding sentences in (1) by the addition of a restrictive expression glossed as "only", in construction with the patient NP:

(17) a. **Georgian**

Orma k'acma mxolod sam-sami czącta c'aifo
two-erg man-erg only three-dist-nom suitcase-nom carried-3sg

b. **Turkish**

Iki adam yalnizca üçer bavul taşidi
two man only three-dist suitcase carried

c. **Rumanian**

Doi oameni au cărat numai cite trei valize
two men have-3pl carried only dist three suitcases

d. **Bura**

Mji' sudá këtë pëntimotë máamáskër dâací
men two took suitcase dist-three only

The four speakers (one for each language) consulted judged the above sentences in two different ways. The speakers of Georgian and Rumanian judged the appropriate sentences in (17) to differ from the corresponding ones in (1) only in affective value, not in the number of suitcases carried. However, the speakers of Turkish and Bura insisted that the restrictive expression in the appropriate sentence in (17) limits the total number of suitcases carried to six—three for each man—as opposed to an arbitrary number of sets of three suitcases for the corresponding sentence in (1). Thus, Turkish yalnizca and Bura dâací force class A interpretations; that is, they force the patient NP to
distribute over the agent NP, ruling out other potential relations of distributivity.\textsuperscript{5}

We have thus shown that adnominal distributive numerals may force either phrasal or clausal distributivity, further distinguishing between clausal distributivity over NPs and clausal distributivity over verbal phrases. However, as indicated by the data cited in this section, it is not the case that all possible relations of distributivity obtain in every given sentence: for example, Rumanian (16b) exhibits only clausal distributivity over a verbal phrase, while Turkish (17b) exhibits only clausal distributivity over an NP. The precise conditions under which various relations of distributivity may obtain are extremely complex, requiring an extensive investigation within each particular language—to do so would be beyond the scope of the present study.\textsuperscript{6} Our goal in the last several pages has been more modest: simply to show that under appropriate circumstances, a relation of distributivity induced by an adnominal distributive numeral may obtain over each of the three types of domain exemplified in (10).

5.1.1.4 Multiple Distributivity

A further possibility involving relations of distributivity remains, however, to be acknowledged. Note that in class C of interpretations of (1) the men may act individually (though, of course, they are free also to act collectively). We may accordingly wish to countenance the possibility that the adnominal distributive numerals in (1) introduce, simultaneously, both phrasal distributivity, as in (10c), and clausal distributivity over the agent NP, as in (10a). This possibility may be represented as follows:
(18) [ [2 UNITS] MAN] [ [S UNITS] CARRIED] [ [3-DIST \rightarrow UNITS] SUITCASE]

Two men each carried sets of three suitcases

Alternatively, in class C interpretations, several sets of three suitcases may have been carried in each of several events. This possibility involves simultaneous phrasal distributivity, as in (10c), and clausal distributivity over the verbal phrase, as in (10b):

(19) [ [2 UNITS] MAN] [ [S UNITS] CARRIED] [ [3-DIST \rightarrow UNITS] SUITCASE]

Two men carried sets of three suitcases each time

In sentences such as (1), it is difficult to ascertain whether multiple distributivity, as in (18) and (19) above, actually occurs. However, in subsequent sections, data will be adduced showing unequivocally that a single distributive numeral may induce two relations of distributivity at the very same time.

5.1.2 Grammatical Relations

As noted in section 2.1, adnominal distributive numerals may, on the whole, occur in the same environments as ordinary cardinal numerals. Until now, we have considered only constructions in which adnominal distributive numerals occur in patient NPs, mostly direct objects. We shall now see that constructions containing distributive numerals in other positions may provide further support for our analysis presented in section 5.1.1.

In (20a-d), the usual sentences with adnominal distributive numerals in patient NPs are reproduced again:

(20) a. Tagalog

Dinala ng dalawang lalaki ang tiglatlong maleta
carried-PT dir two-lig man top dist-three-lig suitcase

118
b. **Georgian**  
\( (\text{lb})=(\text{lc}) \text{ chapter 2} \)  
\[ \text{Orma k'acma sam-sam} \quad \text{c'anta c'aiyo} \]  
two-erg man-erg three-dist-nom suitcase-nom carried-3sg  
c. **Turkish**  
\( (\text{lc})=(\text{ld}) \text{ chapter 2} \)  
\[ \text{Iki adam üçer bavul taşidi} \]  
two man three-dist suitcase carried  
d. **Rumanian**  
\( (\text{ld})=(\text{lf}) \text{ chapter 1} \)  
\[ \text{Doi oameni au cărat câte trei valize} \]  
two men have-3pl carried dist three suitcases  

Sentences (21a–d) are identical to (20a–d), except that the marker of distributivity occurs, instead, on the numeral within the agent NP:

(21) a. **Tagalog**  
\[ \text{Dinala ng tigdalawang lalaki ang tatlong maleta} \]  
carried-PT dir dist-two-lig man top three-lig suitcase  

b. **Georgian**  
\[ \text{Or-orma k'acma sami c'anta c'aiyo} \]  
two-dist-erg man-erg three-nom suitcase-nom carried-3sg  
c. **Turkish**  
\[ \text{Ikiğer adam üç bavul taşidi} \]  
two-dist man three suitcase carried  
d. **Rumanian**  
\[ \text{Câte doi oameni au cărat trei valize} \]  
dist two men have-3pl carried three suitcases  

Recall, now, that the sentences in (20) exhibit three classes of interpretations, paraphrasable as follows:

(22) a. **Class A**  
\( (=2)=(5) \text{ chapter 2} \)  
Two men carried three suitcases each

119
b. **Class B**
   Two men carried the suitcases three at a time

c. **Class C**
   Two men carried sets of three suitcases

By analogy with (22), we would expect the sentences in (21) to exhibit, also, three classes of interpretations, paraphrasable as follows:

(23) a. **Class A**
   Two (possibly different) men carried each of three suitcases

b. **Class B**
   Two men at a time carried (the same) three suitcases

c. **Class C**
   Sets of two men carried (the same) three suitcases

More precisely, we may represent the three classes of interpretations predicted for (21) in terms of the same five semantic parameters used to represent the interpretations of (20), in (4) chapter 2:

(24) a. **Class A**
   
   (i) three sets of two men, one for each suitcase; sets either disjoint or not necessarily so;
   
   (ii) men acted individually or collectively;
   
   (iii) one or many events;
   
   (iv) three suitcases;
   
   (v) suitcases acted upon individually;

b. **Class B**
   
   (i) at least two sets of two men, one for each event; sets either disjoint or not necessarily so;
   
   (ii) men acted preferably collectively;
   
   (iii) many events;
   
   (iv) three suitcases;
   
   (v) suitcases acted upon individually or collectively;
c. Class C

(i) at least two sets of two men, sets preferably disjoint;
(ii) men acted preferably collectively;
(iii) one or many events;
(iv) three suitcases;
(v) suitcases acted upon individually or collectively.

By analogy with our analysis of (1) in (10), we may represent as follows
the relations of distributivity responsible for the three classes of
interpretations of (21) indicated in (23) and (24):

(25) a. Class A

[[2-DIST \text{UNITS} \rightarrow \text{MAN}] [[S \text{UNITS} \rightarrow \text{CARRIED}] [[3 \text{UNITS} \rightarrow \text{SUITCASE}] ]

b. Class B

[[2-DIST \text{UNITS} \rightarrow \text{MAN}] [[S \text{UNITS} \rightarrow \text{CARRIED}] [[3 \text{UNITS} \rightarrow \text{SUITCASE}] ]

c. Class C

[[2-DIST \rightarrow \text{UNITS} \rightarrow \text{MAN}] [[S \text{UNITS} \rightarrow \text{CARRIED}] [[3 \text{UNITS} \rightarrow \text{SUITCASE}] ]

Thus, for class A interpretations the agent NP distributes over the
patient NP, for class B interpretations the agent NP distributes over
the verbal phrase, and for class C interpretations the distributive
numeral distributes, within the agent NP, over its head.

We might thus expect the sentences in (21) to present a precise
mirror image picture of the sentences in (20) with respect to the rela-
tions of distributivity that obtain, and the classes of interpretations
which result. The actual facts, however, belie such expectations. To
begin, speakers often find the sentences in (21) more awkward than the
sentences in (20); for example, the speaker of Turkish consulted with
respect to (21c) judged it to be ungrammatical, while two speakers of
Georgian and one speaker of Rumanian judged the appropriate sentences in (21) to be more complex or difficult to comprehend than the corresponding sentences in (20). These facts are of course reminiscent of the constraints on the occurrence of postnominal each discussed in section 4.3.1; to wit, adnominal distributive numerals, like postnominal each, may occur more freely with direct object NPs than with subject NPs. Thus, the occurrence of adnominal distributive numerals is governed, in most languages, by the same grammatical relations hierarchy argued in section 4.3.1 to govern quantifier scope and quantifier float. (In section 6.3.1, we shall see that the occurrence of adnominal distributive numerals in Tagalog is governed by somewhat different factors.)

Turning now to the semantics of (21), our expectations are contradicted once again. While for (20) classes A, B, and C of interpretations are, grosso modo, equally acceptable, for (21) the acceptability of classes A and B decreases considerably, leaving class C as the predominant or only class of interpretations of such sentences. Thus, when asked how many suitcases there are in (20), speakers often offer $2 \times 3 = 6$ as their first response; however, when asked how many men there are in (21), the same speakers typically answer not $3 \times 2 = 6$, but, instead, $2n$, i.e. any even number. Similarly, for (20) speakers frequently offer as a first choice interpretations in which the men acted individually, but for (21) the same speakers almost invariably insist that the suitcases were acted upon collectively, not individually. Even when made aware of the alternative interpretations for either sentence, speakers generally adhere to their preferences, as described
above. (Of the five speakers consulted who accepted the appropriate sentences in (21) as grammatical, four provided clear indication of such a switch in preferences; these were two speakers of Georgian, one speaker of Rumanian, and one out of two speakers of Tagalog. A second Tagalog speaker provided no indication of any such switch in preferences.)

The above facts may be accounted for straightforwardly in terms of our analysis of distributive numerals, in conjunction with the grammatical relations hierarchy governing quantifier scope. To wit, classes A and B of interpretations of sentences (21) are strongly disfavoured, since (with the exception of Tagalog sentence (21a)—see footnote 7 below) they involve a subject NP distributing over a direct object NP or a verbal phrase, as indicated in (25a,b)—in violation of the grammatical relations quantifier scope hierarchy. (In contrast, classes A and B of interpretations of (20) are much better, since they involve another constituent distributing over a subject NP, as represented in (10a,b)—in accordance with the grammatical relations quantifier scope hierarchy.) In (21), then, the only relation of distributivity not contrary to the grammatical relations quantifier scope hierarchy is that in (25c), where the distributive numeral distributes phrase-internally, over its head. As a result, the sentences in (21) exhibit a strong preference for class C of interpretations over classes A and B of interpretations.7

The relative unavailability of class A interpretations for sentences such as (21) raises an interesting question. Given that states of affairs in which three men carry one suitcase, as in (23a), are just as likely to occur as states of affairs in which one man carries three
suitcases, as in (22a), what alternative strategies do languages have at their disposal for expressing states of affairs such as those described by (23a) or (24a)? Clearly, there are many; we shall, however, be concerned with two—involving the use of distributive numerals. The first and most obvious strategy is passivization: if the patient NP is promoted to subject, other NPs or verbal phrases may then readily distribute over it. The following sentences thus exhibit all three classes of interpretations presented in (24):

(26) a. **Georgian**

\[
\begin{array}{l}
\text{Sami} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\end{array}
\]

three-nom suitcase-nom two-dist-nom men-instr carried-part-sg

b. **Turkish**

\[
\begin{array}{l}
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\end{array}
\]

three suitcase two-dist man by carried-pass

The semantic contrast between the above sentences and their active counterparts thus provides further support for the grammatical relations hierarchy governing, inter alia, the occurrence and interpretations of constructions involving adnominal distributive numerals.

A second strategy offered by speakers of Georgian and Turkish to express the state of affairs in (24a) is perhaps more surprising, involving, as it does, the use of adnominal distributive numerals within both subject and direct object NPs:

(27) a. **Georgian**

\[
\begin{array}{l}
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} & \text{\textcopyright} \\
\end{array}
\]

two-dist-erg man-erg one-dist-nom suitcase-nom carried-3sg

124
b. **Turkish**

Ikişer adam birer bavul taşdı
two-dist man one-dist suitcase carried

Sentences (27a,b) differ from (21b,c) in that the numeral 3 is replaced by an adnominal distributive numeral 1-DIST. These sentences bring to light a construction type not available in languages without adnominal distributive numerals, namely, a single transitive clause containing two markers of distributivity. This construction type is worthy of some further consideration.

In sentences (28) below, adnominal distributive numerals occur not just in one of the two NPs—as in (20) and (21)—but in both agent and patient NPs simultaneously. Although their closest rendering into English—**Two men each carried three suitcases each**—is totally unintelligible, the sentences in (28) are perfectly grammatical in their respective languages:

(28) a. **Tagalog**

Dinala ng tigdalawang lakal ang tigkalong maleta
carried-PT dir dist-two-lig man top dist-three-lig suitcase

b. **Georgian**

Or-orma k'acma sam-sami čanta c'airo
two-dist-erg man-erg three-dist-nom suitcase-nom carried-3sg

c. **Turkish**

Ikişer adam üçer bavul taşdı
two-dist man three-dist suitcase carried

d. **Rumanian**

Ĉite doi oameni au cărat ĉite trei vălize
dist two men have-3pl carried dist three suitcases
What do these sentences mean? Most often, the following:

(29) Sets of two men carried sets of three suitcases

More precisely, they entail the following:

(30) (i) at least two sets of two men, sets preferably disjoint;

(ii) men acted preferably collectively;

(iii) one or many events;

(iv) at least two sets of three suitcases, sets preferably disjoint;

(v) suitcases acted upon preferably collectively;

(vi) each set of men carried at least one set of suitcases, and each set of suitcases was carried by at least one set of men.

(Of the speakers consulted with respect to (28), the above class of interpretations was obtained by two speakers of Georgian, and one speaker each of Turkish and Rumanian. Three Tagalog speakers obtained a different class of interpretations, discussed in footnote 8 below.)

The analysis of (28) is straightforward, involving phrase-internal distributivity within both NPs:

(31) [[2-DIST → UNITS] MAN] CARRIED [[3-DIST → UNITS] SUITCASE]

While in *Two men each carried three suitcases each, the two occurrences of each force contradictory clausal relations of distributivity, in (28) the two adnominal distributive numerals may distribute phrase-internally --and hence are not mutually inconsistent. The existence of "double-distributive" constructions such as (28) in languages possessing distributive numerals is thus predicted by our analysis of phrasal distributivity.
The sentences in (28) may exhibit a variety of alternative classes of interpretations. For example, phrase-internal distributivity may be compound with clausal distributivity in either direction—cf. (18) and (19):

(32) a. \([2\text{-DIST} \rightarrow \text{UNITS}] \text{MAN} \\text{CARRIED} [3\text{-DIST} \rightarrow \text{UNITS}] \text{SUITCASE}\]
Sets of two men each carried sets of three suitcases

b. \([2\text{-DIST} \rightarrow \text{UNITS}] \text{MAN} \\text{CARRIED} [3\text{-DIST} \rightarrow \text{UNITS}] \text{SUITCASE}\]
Sets of three suitcases were each carried by sets of two men

Alternatively, given clausal distributivity as in (32), phrasal distributivity may obtain within only one NP, that which is distributed over clausally by the other:

(33) a. \([2\text{-DIST} \rightarrow \text{UNITS}] \text{MAN} \\text{CARRIED} [3\text{-DIST UNITS}] \text{SUITCASE}\]
Sets of two men carried three suitcases each

b. \([2\text{-DIST UNITS}] \text{MAN} \\text{CARRIED} [3\text{-DIST} \rightarrow \text{UNITS}] \text{SUITCASE}\]
Sets of three suitcases were carried by two men each

Example (33a)—suitably modified—provides what is probably the most appropriate analysis of sentences (27a,b). Finally either or both relations of phrasal distributivity in (31) may be replaced by clausal distributivity over the verbal phrase:

(34) a. \([2\text{-DIST} \rightarrow \text{UNITS}] \text{MAN}[S \text{UNITS} \\text{CARRIED}][3\text{-DIST UNITS}] \text{SUITCASE}\]
Sets of two men carried the suitcases three at a time

b. \([2\text{-DIST UNITS}] \text{MAN}[S \text{UNITS} \\text{CARRIED}][3\text{-DIST} \rightarrow \text{UNITS}] \text{SUITCASE}\]
Two men at a time carried sets of three suitcases

c. \([2\text{-DIST UNITS}] \text{MAN}[S \text{UNITS} \\text{CARRIED}][3\text{-DIST UNITS}] \text{SUITCASE}\]
Two men at a time carried three suitcases at a time
The various classes of interpretations in (32)-(34) exhibit subtle semantic differences that are hard to verify empirically with native speakers. Nevertheless, available data indicates that at least those classes of interpretations consistent with the grammatical relations quantifier scope hierarchy—namely, (32a), (33a), and, perhaps, (34a)—are obtained by speakers of languages with adnominal distributive numerals. 8

5.1.3 Phrase-Internal Conjunctions

In previous sections of this chapter, we have seen how distributive numerals may induce clausal distributivity, and phrasal distributivity over the numeral's head. We shall now observe an additional domain of distributivity induced by adnominal distributive numerals, namely, phrases containing conjoined nouns and adjectives.

Consider the following sentences:

(35) *One man ate three apples and oranges each

(36) a. Tagalog

Kumain ang isang lalaki ng tigatlong apol at saging ate-AT top one-dist man dir dist-three-dist apple and banana

b. Turkish

Bir adam üçer elma ve portakal yedi one man three-dist apple and orange ate

c. Georgian

Ertma k'acma sam-sami vašlebi da portoxalebi one-erg man-erg three-dist-nom apples-nom and oranges-nom č'ama ate-3sg
d. **Rumanian**

Un om a mânca cîte trei mere şi portocale
one man have-3sg eaten dist three apples and oranges

e. **Bura**

ândă duku kátà màngwârò ká gûndâ màamâkàr
man one took mango and papaya three-dist

f. **Maricopa**

ʔipaʔ ʃẹntик kʷxtons ɾnaranks nʔium
man-nom 3-one-sg-ss apple-nom orange-nom pl:obj-3-be-sg-ss/ds

xmokxperm ʔcqawṃ
3-three-sg-dist-ds 3-e-sg-real

While English (35) is clearly ungrammatical, speakers differ with respect to their judgements of the sentences in (36): some judge them to be ungrammatical, while others accept them as grammatical. (Of those consulted, one speaker of Rumanian and one out of two speakers of Georgian judged the appropriate sentences to be ungrammatical, while one speaker each of Tagalog, Bura, and Maricopa, and one out of two speakers of Georgian judged the appropriate sentences to be grammatical; one speaker of Turkish judged (36b) to be ungrammatical, but reversed his judgement several months later.)

Speakers who judge the sentences in (36) to be grammatical assign them one or more of the following classes of interpretations (assuming, for sake of simplicity, that the fruit are apples and oranges):

(37) a. One man ate three apples and three oranges

b. One man ate several sets of three pieces of fruit, each set containing both apples and oranges

c. One man ate several sets of three pieces of fruit, some sets containing apples only, the other sets containing oranges only

129
(Of the speakers who judged the sentences in (36) to be grammatical, one speaker each of Tagalog, Turkish, Bura, and Maricopa assigned the appropriate sentences class (37a) of interpretations, while one speaker of Georgian assigned the appropriate sentence classes (37b) and (37c).)

The above three classes of interpretations of (36) may be accounted for by an analysis paralleling that provided for three doctors and lawyers in (46) chapter 4. The analysis of the relevant NP of (36) is presented below, following which the analysis of three doctors and lawyers is reproduced, to facilitate comparison:

(38) Tigtatlong apol at saging / Üçer elma ve portakal ...

a. \([3\text{-DIST} \rightarrow \text{UNITS}] \not\lessdot [\text{APPLE AND ORANGE}]\) (for (37b))
   Units numbering three each, of apple-orange;

b. \(*[3\text{-DIST} \rightarrow \text{UNITS}] \not\lessdot [\text{APPLE AND ORANGE}]\)
   Units numbering three together, of apple-orange;

c. \([3\text{-DIST} \rightarrow \text{UNITS}] \not\lessdot [\text{APPLE AND ORANGE}]\) (for (37c))
   Units numbering three each of apple, and units numbering three each of orange;

d. \([3\text{-DIST} \rightarrow [\text{APPLE AND ORANGE}]\) (for (37a))
   Units numbering three together of apple, and units numbering three together of orange;

e. \(*[3\text{-DIST} \rightarrow \text{UNITS}] \sim [\text{APPLE AND ORANGE}]\)
   Units numbering three together of apple and of orange.

(39) Three doctors and lawyers

a. \(*[3 \rightarrow \text{UNITS}] \not\lessdot [\text{DOCTOR AND LAWYER}]\)
   Units numbering three each, of doctor-lawyer;

b. \([3 \rightarrow \text{UNITS}] \not\lessdot [\text{DOCTOR AND LAWYER}]\)
   Units numbering three together, of doctor-lawyer;

c. \(*[3 \rightarrow \text{UNITS}] \not\lessdot [\text{DOCTOR AND LAWYER}]\)
   Units numbering three each of doctor, and units numbering three each of lawyer;
d. ?[3 UNITS] → [DOCTOR AND LAWYER]
Units numbering three together of doctor, and
units numbering three together of lawyer;

e. ?[3 UNITS] ~ [DOCTOR AND LAWYER]
Units numbering three together of doctor and of lawyer.

Together, (38) and (39) complete the paradigm developed in section 4.2.3 and 4.2.4 for conjoined nouns, exhibiting all five possible logical relations. Example (38d) accounts for the most common class of interpretations of (36), that in which the distributive numeral distributes externally over the conjunction, as indicated in (37a). Thus, in construction with conjoined nouns, adnominal distributive numerals such as Tagalog tigtatlo "dist-three" behave similarly to English several, some, many, all, etc.; to wit, tigtatlong apol at saging "dist-three-link apple and banana" is synonymous with tatlong apol at tatlong saging "three-link apple and three-link banana", just as English several apples and oranges may be interpreted as synonymous with several apples and several oranges. However, as noted in section 4.2.4, ordinary numerals, as in (39d) above, do not generally distribute externally within phrases: three apples and oranges is not usually synonymous with three apples and three oranges, as is the case for the most common class of interpretations of distributive numerals.9

Examples (38a) and (38c) account for classes of interpretations (37b) and (37c) respectively, obtained by one speaker of Georgian. These are the two logical relations that are never obtained for non-distributive numerals, or for expressions such as several, some, etc., and were consequently not exemplified in section 4.2.4--the reason being that in (38a,c) the numeral distributes over its head. Example (38a)
accounts for class (37b) of interpretations, where several sets of fruit each have cardinality three, and each have the "apple-orange" property, i.e. are of mixed membership. Example (38c) accounts for class (37c) of interpretations, where some sets of cardinality three have the "apple" property, while other sets of cardinality three have the "orange" property. Finally, (38b) is semantically anomalous because individual units or pieces of fruit (as opposed to sets of fruit, as in (38a)) cannot have both the "apple" and the "orange" properties, and (38e) is not obtained for (36) simply because it contains no relation of distributivity.

Thus, ordinary and distributive numerals jointly encompass the entire paradigm of logical relations posited in 4.2.3 and 4.2.4 to account for the interpretations of constructions such as noisy doctors and lawyers. Taken together, English three doctors and lawyers, Tagalog tigtatlong duktor at abogado "dist-three-link doctor and lawyer" and Georgian sam-sami ekimi da damcveli "three-dist-nom doctor-nom and lawyer-nom" exhibit five classes of interpretations—-in (40), corresponding in full to the five classes of interpretations of noisy doctors and lawyers discussed in (35) chapter 4, and reproduced below as (41):

(40) Three doctors and lawyers / tigtatlong duktor at abogado / sam-sami ekimi da damcveli

a. $[3-\text{DIST} \rightarrow \text{UNITS}] \preceq [\text{DOCTOR AND LAWYER}]$ (Georgian)
Units numbering three each, of doctor-lawyer;

b. $[3 \text{ UNITS}] \preceq [\text{DOCTOR AND LAWYER}]$ (English)
Units numbering three together, of doctor-lawyer;

c. $[3-\text{DIST} \rightarrow \text{UNITS}] \preceq [\text{DOCTOR AND LAWYER}]$ (Georgian)
Units numbering three each of doctor, and units numbering three each of lawyer;
d. \( [3 \text{-DIST UNITS}] \rightarrow [\text{DOCTOR AND LAWYER}] \) (Tagalog)
Units numbering three together of doctor, and units numbering three together of lawyer;

e. \( [3 \text{ UNITS}] \sim [\text{DOCTOR AND LAWYER}] \) (English?)
Units numbering three together, of doctor and of lawyer.

(41) Noisy doctors and lawyers.

a. \( [\text{NOISY} \rightarrow \text{UNITS}] \not\sim [\text{DOCTOR AND LAWYER}] \)
Individually noisy (units of) doctor-lawyer;

b. \( [\text{NOISY} \quad \text{UNITS}] \not\sim [\text{DOCTOR AND LAWYER}] \)
Collectively noisy (units of) doctor-lawyer;

c. \( [\text{NOISY} \rightarrow \text{UNITS}] \not\sim [\text{DOCTOR AND LAWYER}] \)
Individually noisy (units of) doctor, and individually noisy (units of) lawyer;

d. \( [\text{NOISY} \quad \text{UNITS}] \rightarrow [\text{DOCTOR AND LAWYER}] \)
Collectively noisy (units of) doctor, and collectively noisy (units of) lawyer;

e. \( [\text{NOISY} \quad \text{UNITS}] \sim [\text{DOCTOR AND LAWYER}] \)
Collectively noisy (units of) doctor and (units of) lawyer.

Let us now turn back to sentences (35) and (36), and see what happens when the singular agent NP is replaced by a plural:

(42) Two men ate three apples and oranges each

(43) a. Tagalog
Kumain ang dalawang lalaki ng tigtatlong apol at saging
ate-AT top two-lig man dir dist-three-lig apple and banana

b. Turkish
Iki adam üçer elma ve portakal yedi
two man three-dist apple and orange ate
c. **Georgian**

Orma k'acma sam-sami vālebi da portoxalebi
two-erg man-erg three-dist-nom apples-nom and oranges-nom
č'ama
ate-3sg

d. **Rumanian**

Doi oameni au muncat câte trei mere şi portocale
two men have-3pl eaten dist three apples and oranges

e. **Bura**

Mji süə kətə màngwəxə kə gündə màaməakər
men two took mango and papaya three-dist

f. **Maricopa**

ʔipæx xviikk k'xtəns narankə n'yìogum
men-nom 3-two-sg-ss apple-nom orange-nom pl:obj-3-be-sg-ss/ds
xmoŋxperm čqawsík
3-three-sg-dist-ds 3-ate-dual-real

While English (35) is totally ungrammatical, (42) is better, since the
direct object NP containing each may now distribute over the plural sub-
ject NP; however, (42) inherits the questionable acceptability of the
NP three apples and oranges. Not surprisingly, those speakers who found
sentences in (36) ungrammatical judge the appropriate sentences in (43)
to be strange in the same way as English (42). However, those speakers
who judge sentences in (36) to be grammatical also judge the appropriate
sentences in (43) to be grammatical, attributing to them one of the fol-
lowing four classes of interpretations:

(44) a. Two men, together, ate three apples and three oranges

   b. Two men, together, ate several sets of three pieces of
      fruit, each set containing both apples and oranges
c. Two men, together, ate several sets of three pieces of fruit, some sets containing apples only, the other sets containing oranges only

d. Two men each ate three apples and three oranges.

(Of the speakers who judged (43) to be completely grammatical, one speaker each of Turkish and Bura assigned the appropriate sentences class (44d) of interpretations, one speaker of Tagalog assigned the appropriate sentence classes (44a) and (44d), and one speaker of Georgian assigned the appropriate sentences classes (44b) and (44c).)

Classes of interpretations (44a–c) may be analyzed in exactly the same way as (37a–c) for (36) -- since, like (37), they involve no clausal distributivity. Class (44d) is more interesting, since it presents the first uncontestable instance we have encountered of multiple distributivity induced by a single adnominal distributive numeral. In order to account for (44d), we must posit external distributivity over the conjunction, as in (38d), plus distributivity of the patient NP as a whole over the agent NP:

\[(45) \quad [[[2-UNITS] \ MAN] \ ATE \ [[[3-DIST \ UNITS] \ \rightarrow \ [APPLE \ AND \ ORANGE]]]\]

Only by positing multiple distributivity is it possible to account for interpretations -- obtained by the speakers of Tagalog, Turkish, and Bura -- in which there is a total of \(3 \times 2 \times 2 = 12\) pieces of fruit, as in (44d). Class (44d) of interpretations of (43) thus provides support for the alternative analysis of sentences such as (1) involving multiple distributivity proposed in section 5.1.1.4.

Adnominal distributive numerals may interact in similar ways with conjunctions of adjectives. Consider the following NPs, corresponding to English three red and blue flowers discussed in section 4.2, but with adnominal distributive numerals:
(46) a. **Tagalog**

Ang tigtatlong pula at asul na bulaklak
top dist-three-lig red and blue lig flower

b. **Georgian**

Sam-sami c'iteli da lurji q'vavilebi
three-dist-nom red-nom and blue-nom flowers-nom

c. **Maricopa**

Payutav'y xwaat'y k xavšuuk n'yí'íum
flower-nom 3-red-pl-sv 3-blue-pl-sv pl:obj-3-be-sg-ss/ds

xmokxperk
3-three-sg-dist-real

In analogy to (37), these NPs may receive the following three classes of interpretations:

(47) a. Three red flowers and three blue flowers

b. Several sets of three flowers, each set containing both red and blue flowers

c. Several sets of three flowers, some sets containing red flowers only, the other sets containing blue flowers only.

Following the analysis of **three red and blue flowers** presented in (47) chapter 4, we may represent as follows the three classes of interpretations of (46):

(48) a. [[[3-DIST $\rightarrow$ UNITS] FLOWER] $\nless$ [RED AND BLUE] (for (46b))

b. *[[[3-DIST UNITS] FLOWER] $\nless$ [RED AND BLUE]

c. [[[3-DIST $\rightarrow$ UNITS] FLOWER] $\nless$ [RED AND BLUE] (for (46c))

d. [[[3-DIST UNITS] FLOWER] $\rightarrow$ [RED AND BLUE] (for (46a))

e. *[[[3-DIST UNITS] FLOWER] $\sim$ [RED AND BLUE]
Again, like in (40), the analysis of (46) presented in (48) above and the analysis of *three red and blue flowers* presented in (47) chapter 4 jointly exhaust all five possible logical relations between the various constituents involved.

In section 5.1, we explored the syntax and semantics of adnominal distributive numerals, laying particular emphasis on the domains over which they may induce distributivity. We found that adnominal distributive numerals may cause the expressions containing them to distribute clausally, over another NP or verbal phrase, or to distribute phrasally, over their classifier head or over a conjunction. In doing so, a wide range of interpretations of variegated construction types were provided with a unified analysis based on a binary relation of distributivity obtaining over a variety of domains. In the remainder of this chapter, we shall extend our analysis, in order to account for adverbial distributive numerals, and distributive numerals qualifying verbs.

5.2 Adverbial Distributive Numerals

In section 3.2.2, examples were presented of numerals semantically qualifying nouns, although not in construction with them syntactically—e.g. Japanese (19b) *Hon o issatsu kaitai* "I want to buy a book", with adverbial numeral phrase *issatsu* "one-volume". Adverbial distributive numerals present what is probably the most widespread instance of adverbial numerals qualifying nouns, occurring, as they do, in probably all of the world's languages.

Constructions containing adverbial distributive numerals generally exhibit a proper subset of the interpretations of the corresponding constructions containing adnominal distributive numerals. To wit, while

137
adnominal distributive numerals may induce clausal distributivity over a NP or a verbal phrase, adverbial distributive numerals may induce distributivity only over a verbal phrase. Moreover, phrase-internally, adnominal distributive numerals may induce distributivity over a classifier head or a conjunction, whereas adverbial distributive numerals induce distributivity only over classifier heads. Thus, for example, sentences such as (1) chapter 2 with adnominal distributive numerals exhibit classes A, B, and C of interpretations, while sentences such as (3) chapter 2 with adverbial distributive numerals exhibit only classes B and C of interpretations.

Our analysis of adverbial distributive numerals is thus straightforward, drawing directly upon the analysis of synonymous constructions involving adnominal distributive numerals. Consider, for example, the following Georgian sentences with adnominal and adverbial distributive numerals respectively:

(49) a. Orma k'acma sam-sami ɣanta c'aiyo
    two-erg man-erg three-dist-nom suitcase-nom carried-3sg
    (= (lb)=(lc) chapter 2)

b. Orma k'acma ɣantebi c'aiyo sam-samat
    two-erg man-erg suitcases-nom carried-3sg three-dist-adv
    (= (3sg) chapter 2)

Sentence (49a) with adnominal distributive numeral sam-sami and classes A, B, and C of interpretations was analyzed in section 5.1.1 as in (50) below (= (10)). Sentence (49b) with adverbial distributive numeral sam-samat and classes B and C of interpretations may accordingly be analyzed as in (51) below. (In (51), and in subsequent examples, the broken line indicates the semantic relation of qualification, while the solid line indicates, as before, distributivity):
As indicated in (50) and (51) above, a uniform logical analysis is provided for adnominal and adverbial distributive numerals. This uniform analysis captures the relations of entailment and synonymy holding between corresponding constructions involving adnominal and adverbial distributive numerals, e.g. (49a) with classes A, B, and C of interpretations entailing (49b) with classes B and C of interpretations only. The uniform analysis may also account for the morphosyntactic similarity between adnominal and adverbial distributive numerals discussed in section 2.3.1, e.g. Georgian *sam-sami* and *sam-samat* in (49), or the adnominal and adverbial Pangasinan *santatlo*. It thus portrays adnominal and adverbial distributive numerals as two syntactically conditioned variants of a single construction type in universal grammar—-as was suggested to be the case in chapter 2.

By invoking the unified analysis principle (2) of chapter 1, it is now possible to provide an affirmative answer to the question posed at the beginning of chapter 2, namely, whether expressions such as the
English *in threes* and *three by three* are, as suggested by Jespersen, bona fide distributive numerals. English *in threes* is synonymous to Georgian *sam-samat*; hence, unless good reasons to the contrary suggest themselves, it should be analyzed like *sam-samat*, as an adverbial distributive numeral.\(^{10}\) We may, accordingly, now use English adverbial distributive numerals to illustrate some of the semantic distinctions discussed in this chapter (perhaps to the relief of those readers not fluent in Tagalog, Georgian, Maricopa, etc., who have reached this stage).

Consider the following sentences:

(52)  
\begin{itemize}
  \item a. The boys left in threes
  \item b. The boys left three by three
  \item c. The boys left three at a time
\end{itemize}

Sentences (52a–c) exhibit a distinction between clausal distributivity (of the numeral and its head over the verbal phrase) and phrasal distributivity (of the numeral over its covert classifier head). These may be represented as follows:

\[
\begin{array}{c}
\text{a. }[[\text{THE BOYS}][[\text{S UNITS}]] \text{ LEFT}][3\text{-DIST} \text{ UNITS}] \\
\text{b. }[[\text{THE BOYS}][[\text{S UNITS}]] \text{ LEFT}][3\text{-DIST} \rightarrow \text{UNITS}]
\end{array}
\]

Interpretations involving clausal distributivity, as in (53a), are those where for each event, three boys left; they may have left individually or in groups. Interpretations involving phrasal distributivity, as in (53b), are those where the boys were grouped in sets of three; the various groups may have left successively or all at once. In other words, clausal distributivity imposes a temporal-aspectual organization on the
subject NP, while phrasal distributivity imposes a spatial organization. (Recall Cassirer's comments on the two realizations of number, footnote 5 chapter 3.) Speakers of English may appreciate this distinction by contrasting sentences (52a-c). While in threes in (52a) allows for both clausal and phrasal distributivity, three by three creates a preference for clausal distributivity, and three at a time forces clausal distributivity, ruling out its phrasal counterpart. 11

In example (16) section 5.1.1.3, it was shown how aspect may block distributivity over a verbal phrase in Rumanian. We may now construct similar examples in English. In (54) below, the simple past form left of (51) is replaced by a present perfect form have left. Since the perfective aspect involved but a single event, the verbal phrase have left in (54) may not be distributed over, hence only phrasal distributivity is obtained in (54). As a result, in threes (allowing both clausal and phrasal distributivity) is grammatical in (54a), but three by three (creating a preference for clausal distributivity) is questionable in (54b), while three at a time (forcing clausal distributivity) is ungrammatical in (54c):

(54) a. The boys have left in threes
    b. *The boys have left three by three
    c. *The boys have left three at a time

Similarly, punctual verbal phrases such as sat down may be distributed over (since they may refer to several events), whereas stative verbs such as sat may not (since they refer to only one event). Hence the sentences in (55) but not those in (56) permit clausal distributivity—resulting in the judgements indicated below:

141
(55) a. The boys sat down in threes  +  + 
b. The boys sat down three by three  +  ? 
c. The boys sat down three at a time  +  -

(56) a. The boys sat in threes  -  + 
b. The boys sat three by three  -  ? 
c. The boys sat three at a time  -  -

Thus, (54c) *The boys have left three at a time and (56c) *The boys sat three at a time are bad for just about the same reason as is (14a) *One man carried three suitcases each. In both sentences, a semantically singular constituent prevents distributivity from occurring: this constituent is a verbal phrase in (54, 56c) and a noun phrase in (13a). Examples such as the above underscore the behavioural parallel between nominal and verbal expressions with respect to the logical notions of number and distributivity.  

As indicated in (53a), clausal distributivity induced by adverbial distributive numerals applies to the covert constituent SEVERAL UNITS and not to the verbal phrase as a whole. In other words, distributivity is over events, not over any other possible "plural" dimension of the verb. This contrast is illustrated by the following two sentences in Tagalog:

(57) a. Nangingisda at namamangka ang mga lalaki nang tatlu-tatlo finished-AT and sailed-AT top pl man adv dist-three 
b. Nangingisda at namamangka ang tigtatlong lālaki fished-AT and sailed-AT top dist-three-lig man
Sentence (57a) with adverbial distributive numeral tatlu-tatlo is synonymous with English The men fished and sailed in threes; it may exhibit either phrasal distributivity, as in (58a), or clausal distributivity, as in (58b). Sentence (57b) with adnominal distributive numeral is synonymous with English Three men fished and three men sailed; it exhibits only clausal distributivity, as in (59):

\[(58) \quad \begin{align*}
\text{a. } & \left[ [\text{S UNITS}] \text{ MAN} \right] \left[ [\text{S UNITS}] \text{ [FISHED AND SAILED]} \right] \left[ 3\text{-DIST} \rightarrow \text{UNITS} \right] \\
\text{b. } & \left[ [\text{S UNITS}] \text{ MAN} \right] \left[ [\text{S UNITS}] \text{ [FISHED AND SAILED]} \right] \left[ 3\text{-DIST} \rightarrow \text{UNITS} \right]
\end{align*}\]

\[(59) \left[ [\text{3-DIST UNITS}] \text{ MAN} \right] \left[ [\text{S UNITS}] \text{ [FISHED AND SAILED]} \right]\]

Note that while in (59) the subject NP distributes externally, over the two conjuncts of the verbal phrase, in (58b) the numeral phrase distributes over the covert constituent SEVERAL UNITS in construction with the verbal phrase. Hence, in (58b) three men participated in each event, while in (59) three men participated in each kind of activity (fishing or sailing). Tagalog sentences (57) thus show that while adnominal distributive numerals may induce external distributivity over a conjoined verbal phrase, the only type of clausal distributivity that adverbial distributive numerals may induce is over events. (Of course, adnominal distributive numerals frequently also induce distributivity over events, as in (50b).)

To conclude our discussion of adverbial distributive numerals, let us take note of the following type of construction:

\[(60) \quad \text{Eight men carried ten suitcases in twos}\]

In addition to exhibiting both clausal distributivity—as in (61), and phrasal distributivity—as in (62), the above sentence is ambiguous as
to whether the men acted in twos—as in (61,62a), or the suitcases
were acted upon in twos—as in (61,62b):

(61) a. \[ [[8 \text{ UNITS}] \text{ MAN}][[8 \text{ UNITS}] \text{ CARRIED}][[10 \text{ UNITS}] \text{ SUITCASE}][2-\text{DIST UNITS}] \]

b. \[ [[8 \text{ UNITS}] \text{ MAN}][[8 \text{ UNITS}] \text{ CARRIED}][[10 \text{ UNITS}] \text{ SUITCASE}][2-\text{DIST UNITS}] \]

(62) a. \[ [[8 \text{ UNITS}] \text{ MAN}][[8 \text{ UNITS}] \text{ CARRIED}][[10 \text{ UNITS}] \text{ SUITCASE}][2-\text{DIST UNITS}] \]

b. \[ [[8 \text{ UNITS}] \text{ MAN}][[8 \text{ UNITS}] \text{ CARRIED}][[10 \text{ UNITS}] \text{ SUITCASE}][2-\text{DIST UNITS}] \]

As indicated above, the relation of qualification, represented by
broken lines, is logically independent of the relation of distributivity,
represented by solid lines.

Note that, for example, in (61,62a), MAN is qualified by two
numeral phrases, 8 UNITS and 2-DIST UNITS. The men thus number a total
of eight while being organized—temporally in (61a), spatially in (62a)—
in twos. Analogous facts hold for SUITCASE in (61,62b). We have al-
ready seen—in footnote 10 chapter 4—one instance of two cardinal
numerals qualifying the same noun. In sections 7.3 and 8.4.2 we shall
come across numerous other constructions in which two adnominal numerals,
one or both of which are distributive, qualify the same noun.

5.3 Distributive Numerals Qualifying Verbs

In this chapter, we have considered, until now, distributive
numerals—of the adnominal and adverbial varieties—qualifying nouns.
In section 3.2.3, however, it was shown that numerals may qualify not
only nouns but, also, verbs. Furthermore, in section 4.2.2 and 4.2.4
it was suggested that verbs may enter into relations of distributivity with other constituents—and, in previous sections of this chapter, we saw how adnominal and adverbial distributive numerals may force various constituents to distribute over verbal phrases. It should thus come as little surprise to find distributive numerals qualifying verbs.

In Georgian, the suffix -jer is added to numerals qualifying verbs; thus, sami "three-nom", samjer "three-time", and, for distributive numerals, sam-sami "three-dist-nom", sam-samjer "three-dist-time". Conside

(63) a. Orma k'acma sam-samjer imyera
two-erg man-erg three-dist-time sang-3sg
b. Or-orma k'acma samjer imyera
two-dist-erg man-erg three-time sang-3sg
c. Or-orma k'acma sam-samjer imyera
two-dist-erg man-erg three-dist-time sang-3sg

As expected, (63a–c) are interpreted as in (64)–(66) respectively:

(64) a. Two men sang three times each
b. (The same) two men sang sets of three times
c. Two men each sang sets of three times

(65) a. ?Two (possibly different) men sang each of three times
b. Sets of two men sang (the same) three times
c. ?(Possibly different) sets of two men sang each of three times

(66) a. Sets of two men sang sets of three times
b. Sets of two men each sang sets of three times
c. ?(Possibly different) sets of two men sang each set of three times
d. Sets of two men each sang three times

\[ \text{e. Two (possibly different) men sang each set of three times} \]

Classes (64)-(66) of interpretations may be represented straightforwardly as in (67)-(69) respectively:

\begin{align*}
(67) & \quad \text{a. } [[\text{2 UNITS MAN}] [\text{3-DIST UNITS} \text{ SANG}]] \\
& \quad \text{b. } [[\text{2 UNITS MAN}] [\text{3-DIST } \rightarrow \text{ UNITS} \text{ SANG}]] \\
& \quad \text{c. } [[\text{2 UNITS MAN}] [\text{3-DIST } \rightarrow \text{ UNITS} \text{ SANG}]] \\
(68) & \quad \text{a. } [[\text{2-DIST UNITS MAN}] [\text{3 UNITS} \text{ SANG}]] \\
& \quad \text{b. } [[\text{2-DIST } \rightarrow \text{ UNITS MAN}] [\text{3 UNITS} \text{ SANG}]] \\
& \quad \text{c. } [[\text{2-DIST } \rightarrow \text{ UNITS MAN}] [\text{3 UNITS} \text{ SANG}]] \\
(69) & \quad \text{a. } [[\text{2-DIST } \rightarrow \text{ UNITS MAN}] [\text{3-DIST } \rightarrow \text{ UNITS} \text{ SANG}]] \\
& \quad \text{b. } [[\text{2-DIST } \rightarrow \text{ UNITS MAN}] [\text{3-DIST } \rightarrow \text{ UNITS} \text{ SANG}]] \\
& \quad \text{c. } [[\text{2-DIST } \rightarrow \text{ UNITS MAN}] [\text{3-DIST } \rightarrow \text{ UNITS} \text{ SANG}]] \\
& \quad \text{d. } [[\text{2-DIST } \rightarrow \text{ UNITS MAN}] [\text{3-DIST } \text{ SANG}]] \\
& \quad \text{e. } [[\text{2-DIST } \rightarrow \text{ UNITS MAN}] [\text{3-DIST } \rightarrow \text{ UNITS} \text{ SANG}]]
\end{align*}

The Georgian sentences in (63) and their analysis as represented in (67)-(69) highlight the logical parallel between nouns and verbs with respect to number and distributivity. In all three sentences, numerals qualify both noun and verb. While in (63a) the distributive numeral sam-samjer may cause the verb to distribute over its subject NP—as in (67a), in (63b) the distributive numeral or-orma may cause the subject NP to distribute over the verb—as in (68a), though this particular relation of distributivity is disfavoured by the grammatical relations quantifier scope hierarchy. Our analysis of (63) in (67,68a) is thus analogous to that offered for English *Three boys each sang twice* in (58d,e) chapter 4.
Alternatively, *sam-samjer* in (63a) and *or-orma* in (63b) may distribute phrase-internally over their heads—as in (67b) and (68b) respectively. While the classifier head of *or-orma* is covert, that of *sam-samjer* is none other than the suffix -*jer*. Thus, corresponding to the Turkish adnominal distributive numeral plus classifier constructive *üçer* $\rightarrow$ *tane* in (9b), we have for Georgian distributive numerals qualifying verbs:

(70) *sam-sam* $\rightarrow$ *jer*

The existence of an overt morpheme -*jer* over which *sam-sam* may distribute lends strong support to our analysis of verbal phrases as containing a (usually covert) constituent SEVERAL UNITS—introduced in (49) section 4.2.4 and invoked throughout this chapter in order to account for distributivity over verbal phrases. Georgian -*jer* thus denoted sets of events, represented above by the logical classifier constituent UNITS.

Finally, as indicated in (67)-(69), sentences (63a-c) possess additional classes of interpretations characterized by multiple distributivity. Analyses (67)-(69) thus correspond closely to the analyses of sentences (20), (21), and (28) offered in the course of this chapter; for those sentences, distributivity obtains for the most part within and across NPs, whereas in sentences (63a-c) distributivity obtains within and between an NP and a verbal phrase. The similarity between these analyses and, also, those offered for adverbial distributive numerals in section 5.2, underscore the logical unity of distributive numerals in their various guises: adnominal, e.g. *sam-sam*, adverbial, e.g. *sam-samat*, and as qualifiers of verbs, e.g. *sam-samjer*. 

147
5.4 **Summary—and a New Introduction**

This concludes our analysis of distributive numerals. In this chapter we considered three major types of distributive numerals—adnominal, adverbial, and qualifying verbs—occurring in a variety of syntactic constructions. Distributive numerals exhibit a considerable degree of semantic diversity; however, as argued in this chapter, all interpretations of constructions involving distributive numerals may be accounted for in terms of a single binary semantic relation of distributivity. The semantic richness of distributive numerals results from the variety of domains over which distributivity may obtain: in this chapter, evidence was adduced to support relations of distributivity obtaining clausally, between NPs and/or verbal phrases, and phrasally, between a distributive numeral and its classifier head, or over conjunctions.

Our analysis of distributive numerals involves certain assumptions which are of considerable theoretical interest. One, introduced in chapter 3, is the possibility that numerals may qualify expressions belonging to various syntactic categories (and not just nouns); another, introduced in chapter 4 and mentioned above, is that distributivity may obtain between expressions of a variety of syntactic categories (and not just between or over nouns or NPs). These two assumptions, it seems, jointly reflect a profound logical unity, with respect to quantification, of various syntactic categories—in particular, nouns and verbs; this unity would appear to run counter to most current theorizing in syntax and semantics. A further, more specific assumption, introduced in chapter 4 and invoked frequently thereafter, is that the logical forms

148
of all nominal and verbal phrases must contain, inter alia, a numeral plus classifier constituent—one that, in many instances, is not overtly realized. It is, unfortunately, beyond the scope of this dissertation to explore further the many ramifications of these assumptions.

We have now reached a midpoint, of sorts, in the course of this dissertation. After introducing distributive numerals in chapter 2, we developed an understanding of numerals and distributivity in chapters 3 and 4 which enabled us to provide an analysis of distributive numerals in chapter 5. Our approach was, for the most part, universally oriented—in that we paid greater attention to those properties of distributive numerals common to most languages, passing by many properties that are language specific. In the second half of this dissertation, we shall adopt a somewhat different approach, one that might be characterized more appropriately as relativistic. Making use of our analysis of distributive numerals developed in chapter 5, we shall embark on a more extensive study of the syntax and semantics of distributive numerals and related constructions in three particular languages—Tagalog, Georgian, and Maricopa. In each chapter, we shall attempt to view distributive numerals in terms of their role within larger grammatical systems. For example, we shall see that in Georgian, adnominal distributive numerals are a subclass of distributive adjectives, while in Maricopa they are a subclass of distributive verbs. Our goal in each of the three chapters that follow will be three-fold: (a) to apply the analysis of distributive numerals developed in this chapter to a variety of specific constructions in particular languages—thereby providing further support for the analysis; (b) to show how constructions involving distributive numerals may contribute to a better
understanding of the grammatical properties of individual languages;
and (c) to amass a corpus of data pertaining to distributive numerals,
in order to facilitate the formulation of cross-linguistic universals.
Finally, in chapter 9, we shall provide a number of generalizations
governing the syntax and semantics of distributive numerals in the
world's languages, thereby effecting a synthesis of relativist and
universalist approaches to the study of language.
Footnotes - Chapter 5

1 Note that whereas in (7b), with HEAVY, the units of suitcase are interpreted as individual suitcases, in (8b), with a distributive numeral, the units of suitcase are interpreted as sets of three. The cardinality of the suitcase units in (8b) is of course predicated by the distributive numeral; however, there is no corresponding element in (7b) forcing the units of suitcase to be of cardinality one—i.e., sets of individual suitcases, and not, say, sets of three suitcases, or, for that matter, even suitcase thirds. It seems to me that the best way of handling the correct interpretation of the suitcase units in (7b) is pragmatically: whenever the nature (or cardinality) of the units is not explicitly predicated—as by a distributive numeral in (8b)—a pragmatic default condition ensures that the units are interpreted in the most natural way, which, in the case of suitcases (and most other items) is as singleton objects.

2 Our analysis explains most of the properties of classes A, B, and C of interpretations, but not all: some, e.g. the preference for suitcases to be acted upon collectively in classes B and C, or the preference for the sets of suitcases to be disjoint in C, remain unaccounted for. These parameters exhibit considerable idiolectal, dialectal, and cross-linguistic variation, and would appear to be best accounted for pragmatically, rather than semantically. We shall not attempt such an account in this dissertation. These parameters are discussed further in section 6.4.1.

3 In example (10), it is assumed that the logical form of every phrase contains a numeral plus classifier constituent, e.g. 2 UNITS; moreover, it is assumed that in (10a)—like, as we saw, in (10b)—it is this constituent over which the expression containing the distributive numeral distributes. Although these assumptions would appear to be reasonable corollaries of our analysis, we shall not attempt to defend them here, since we are not concerned in this dissertation with the postulation of explicit logical forms. For ease of exposition, we shall omit (as we have done before) the numeral plus classifier constituent when it is not of importance to the point at hand—e.g. the constituent 2 UNITS in examples like (10b,c), where the agent NP is not involved in a relation of distributivity.

4 Our analysis of distributivity in (1) and (10) is reminiscent of similar phenomena pertaining to other binary semantic relations. Consider the following instance of anaphora:

(i) John told Bill he had to leave

In (i) he may be anaphorically bound by either John or Bill. Thus, anaphora functions above in a manner parallel to distributivity in (10) and (1). Clearly, one would not wish to posit, for English, as many logically distinct but homophonous pronouns as there are types of construction binding them.

151
Analogous examples may be constructed involving the semantic relation of qualification:

(ii) John saw Bill in the park

In (ii), the prepositional phrase in the park may qualify either John or Bill. A similar example to (ii), involving an adverbial distributive numeral qualifying, alternatively, one of two NPs in the clause, is given below, in (60), section 5.2.

5 I have no explanation as to why expressions such as these should force one kind of distributivity and not another. With regard to phrasal distributivity, it may be the case that constructions such as the following are conceived to be semantically or pragmatically incoherent:

(1) ONLY [[3-DIST → UNITS] SUITCASE]

That is to say, ONLY, with negative affective force, may be viewed as conflicting with the particular interpretation of the distributive numeral: "Only several/many sets of three suitcases". This does not explain, however, why clausal distributivity over the verb may also be ruled out.

As noted in section 3.1.2, some languages have a series of restrictive distributive numerals formed from the basic cardinal series by morphological processes. Unfortunately, I have no information as to how sentences such as (17) are interpreted in such languages. Interestingly, while Turkish may employ morphological processes to form both restrictive numerals (suffixation of -cik to numeral classifier) and distributive numerals (suffixation of -ger or morphophonemic variant thereof to numeral), these two strategies may not cooccur: forms like üçer tanecik "three-dist unit-only" are ungrammatical, and a periphrastic construction involving yalnîzca "only" must be used instead--as, for example, in sentence (17b).

6 One reason for this is that, as noted earlier, this is a domain where variation is rampant, with two speakers of the same language sometimes offering diametrically opposed judgements, and the same speaker occasionally reversing his/her own judgements from one week to the next. It is thus nearly impossible, in a study of the present scope, to determine whether patterns of variation such as those discussed above represent bona fide cross-linguistic variation, or whether they reflect merely the caprices of individual speakers during particular elicitation sessions. Accordingly, no attempt is made to precisely delimit the conditions under which the various relations of distributivity may occur --to do so adequately would require a much more comprehensive study involving large populations of speakers of each language investigated. It should be emphasized, though, that whatever the nature of this variation (idioclectal, dialectal, or cross-linguistic), the Logical Variation Principle proposed in chapter 1 stipulates that it must be reflected by an empirically adequate logic for natural language. Such variation is thus a worthy object of linguistic variation.
However, as noted in chapter 4, quantifier scope in Tagalog is governed by a different hierarchy, based on thematic, rather than grammatical relations; this hierarchy calls for patient NPs to have wider scope than agent NPs. (This is, of course, related to the fact that Tagalog has no grammatical relations of subject and direct object in the usual sense.) Neither of the Tagalog speakers' judgements appear to be consistent with the aforementioned hierarchy. I have no explanation of this inconsistency, other than speculating that speakers of Tagalog may oscillate between the thematic relations hierarchy characteristic of several other Austronesian languages, and the universally unmarked grammatical relations hierarchy. These questions are taken up again in more detail in chapter 6.

Turning now to the speaker of Rumanian, we note that he offered an additional class of interpretations for sentence (21d):

(i). Sets of two men each carried three suitcases

This class of interpretations allows for several sets of two men, and for several sets of three suitcases. It may be accounted for easily by assuming, in addition to the phrase-internal distributivity induced by the distributive numeral, that the direct object NP distributes over the subject NP. This second relation of distributivity is not induced by the distributive numeral, but, instead, results from the usual grammatical relations quantifier scope hierarchy, allowing distributivity to occur even when no overt marker of distributivity is present. We may represent these facts as follows:

(ii) \[ \begin{array}{c}
\text{[[2-DIST } \rightarrow \text{ UNITS] MAN}} \text{ CARRIED [3 SUITCASES]}
\end{array} \]

In addition to the above, some speakers also interpreted the sentences in (28) in more problematic ways, attributing to them the class C interpretations of (20), viz. (22c), and of (21), viz. (23c). For these interpretations it would appear that one of the distributive numerals no longer induces distributivity, but, instead, is interpreted as an ordinary cardinal numeral:

(i) a. \[ \text{[[2-DIST UNITS] MAN} \text{ CARRIED [[3-DIST } \rightarrow \text{ UNITS] SUITCASE]}
\]

b. \[ \text{[[2-DIST } \rightarrow \text{ UNITS] MAN} \text{ CARRIED [[3-DIST UNITS] SUITCASE]}
\]

(Class (22c) of interpretations, represented in (i/a), was accepted by one speaker of Georgian, and rejected by one speaker each of Turkish, Georgian, and Rumanian, and three speakers of Tagalog. Class (23c) of interpretations, represented in (i/b), was accepted by three speakers of Tagalog, one speaker of Turkish, and one speaker of Georgian, and rejected by one speaker of Georgian, and one speaker of Rumanian. With the exception of the three speakers of Tagalog, every speaker who accepted one of the above classes of interpretations also accepted class of interpretation (29), represented in (31).

I have no explanation for the availability of these interpretations other than an ad hoc one: due to the complexity of "double-distributive" constructions, speakers simply ignore one of the markers of distributivity. Assuming this to be the case, it is at least possible to account for the consistent preference of class (23c) of
interpretations by three speakers of Tagalog: in Gil (1982b) it is argued that this reflects the tendency for patient NPs to be more strongly referential than agent NPs in Tagalog and other Austronesian languages. In the case at hand, the patient NP refers to a unique set of three objects, while the agent NP fails to refer to such a unique set. See section 6.4.2 for further discussion.

Of course, as noted in footnote 10 chapter 4, numerals may distribute externally across clauses, e.g. the apples and the oranges number three each.

With respect to the phrase-internal variety of external distributivity, we may note that (38d) and its like provide a posteriori support for the analysis of class C of interpretations of distributive numerals proposed in section 5.1.1.2. This is because external distributivity presents the most obvious and uncontroversial instance of a relation of distributivity involving a distributive numeral obtaining phrase-internally. Thus, Tagalog tigtatlong apol at saging in (36a) is clearly synonymous to tatlong apol at tatlong saging, where the numeral tatlo "three" has distributed over the nominal conjuncts. Granted the existence of phrase-internal distributivity in clearly visible cases such as these, it is accordingly much more plausible to posit phrase-internal distributivity also in those instances where it is less apparent, namely, where it obtains between a distributive numeral and its classifier head, for class C interpretations—and, also, in (38a,c) above.

Observe, however, that while Georgian sam-samati corresponds closely to the adnominal sam-sami, English in threes has no adnominal counterpart. This gives rise to an interesting methodological situation, whereby the road to a proper understanding of English in threes passes through Georgian sam-samati. To wit, the distributive nature of English in threes becomes evident upon consideration of Georgian sam-samati, which, unlike in threes, may induce distributivity where it is more readily recognizable as such—namely, between two NPs. The resulting unified "distributive" analysis of the various classes of interpretations of sam-samati is subsequently inherited by adverbial sam-samat—and, finally, by English in threes.

These observations may be supported anecdotally. At an earlier stage of this study, I did not suspect that expressions such as three...each and in threes were related in any way: the former seemed to me to force distributivity, while the latter seemed to effect grouping—two diametrically opposed notions. My surprise was thus great when I first became aware of languages which translate English three...each and in threes into similar or identical expressions. If I had not studied Georgian, Turkish, and other languages, I do not think I would have arrived at what I consider to be the correct analysis of English expressions such as in threes—involving relations of distributivity.

We include three at a time in the present discussion for purpose of comparison, even though it is not, strictly speaking, a distributive
numeral. Semantically, it has all the properties of a distributive numeral, but, syntactically, it belongs to a more complex but very common construction type of the form:

(i) \[ \text{NP} \rightarrow \{ \text{NP}, \text{PP} \} \]

Examples of this construction are three (books) per person, five (books) to the shelf, ten (apples) a dollar, ten (cents) an apple. This construction type frequently occurs recursively:

(ii) \[ \text{NP} \rightarrow \text{NP} \rightarrow \text{PP} \rightarrow \text{NP} \rightarrow \text{NP} \text{ the face flannel} \]
(recorded in the Petticoat Lane market, London, England)

The following Hebrew example—parallel to (ii)—provides some indication of the universality of this pattern:

(iii) \[ \text{NP} \rightarrow \text{NP} \rightarrow \text{NP} \rightarrow \text{NP} \text{ kilo wañeci → beme?a} \rightarrow \text{tapuhey adama} \]

"A kilogram and a half for a hundred (pounds) the potatoes"
(recorded in the central market, Netanya, Israel)

It is interesting to contrast three at a time with the synonymous Kiwai expression -?obi exemplified in (64d) section 4.2.2, consisting of verbal suffixes -?o "at a time" marking distributivity of direct object over verb, plus -bi "three": -?obi would appear to be a distributive numeral occurring in construction with a verb, rather than adverbially, as in three at a time. However, we shall not characterize -?obi as a distributive numeral for the obvious reason that it is probably not even a constituent: under the most plausible analysis, the suffix -bi applies not to -?o but to suffixed verbal forms such as ido?o "pick ... at a time".

12 Some speakers of English may perhaps feel that (14a) is more categorically unacceptable than (54a). Judgements of the sentences in (52), (54)–(56) do admittedly exhibit a certain degree of dialectal variation (the judgements indicated were provided by a number of speakers of British English; American speakers may differ somewhat in their use of the present perfect). However, as noted in section 5.1.1.3, dialectal variation is also evident with respect to sentences corresponding to (14a) with distributive numerals. Thus, for example, two speakers of Georgian offered conflicting grammaticality judgements for sentence (15c), with singular subject NP.
Chapter 6

6. Distributive Numerals in Tagalog

It is convenient to commence the investigation of distributive numerals in particular languages with a study of distributive numerals in Tagalog. First, Tagalog is a comparatively well-studied language, with several available grammatical descriptions—e.g. Bloomfield (1917), Blake (1925), Schachter and Otanes (1972), Llamzon (1976) and several others. In addition, Tagalog possesses a wide range of constructions involving distributive numerals—for which better descriptions are already available than perhaps any other language—e.g. Blake (1925:26-29, 220-222, 278), Schachter and Otanes (1972:210-214). Moreover, these descriptions may be complemented by information on distributive numerals in a number of related Philippine languages—e.g. Blake (1907), Llamzon (1978). In this chapter, we shall explore selected topics in the morphology, syntax, and semantics of distributive numerals in Tagalog—with a view towards the three goals defined at the end of the preceding chapter.1

6.1 Some Features of Tagalog Grammar

In order to facilitate our analysis of distributive numerals in Tagalog, we must be aware of some of the more salient characteristics of Tagalog grammar. In this section, we shall survey some of these characteristics, showing that two very basic grammatical notions—grammatical relations and syntactic categories—play a less central role in the grammar of Tagalog than in the grammars of other languages, including
English. These facts will subsequently be of importance to the investigation of distributive numerals in Tagalog.

6.1.1 Patient Prominence

With respect to basic word order, Tagalog is a verb-initial language. Perhaps the most outstanding feature of Tagalog clause structure is its well developed verbal voice system and concomitant case marking--exemplified in (1a-d) below. In each of the following four sentences, a different one of the four NPs is marked with the preposition *ang* as topic; the remaining three NPs are marked with case marking prepositions indicating thematic relations: *ng* for direct cases, *sa* for locative, and/or *para sa* for benefactive. The thematic relation of the topic NP is marked in each sentence with a verbal affix attached to the stem *patay* "kill": actor topic prefix *nag-* , patient topic infix *-in-* , locative topic circumflex *pinag-* *-an* , and benefactive topic prefix *ipinag-* . (These suffixes may vary in form for different verb classes.) NPs marked with *ang* are interpreted as definite, NPs marked with *ng* as indefinite, and NPs marked with other prepositions as either definite or indefinite. The following four sentences are thus synonymous, except for the definiteness of the various NPs--and, of course, pragmatically.

(1) a. Nagpatay ang lalaki ng manok sa bahay para sa bata
    killed-AT top man dir chicken obl house forobl boy

        b. Pinatay ng lalaki ang manok sa bahay para sa bata
    killed-PT dir man top chicken obl house for obl boy

        c. Pinagpatayan ng lalaki ng manok ang bahay para sa bata
    killed-LT dir man dir chicken top house for obl boy

        d. Ipinagpatay ng lalaki ng manok sa bahay ang bata
    killed-BT dir man dir chicken obl house top boy

    "A/the man killed a/the chicken in a/the house for a/the boy"

157
Tagalog would thus appear to possess a productive strategy for passivization; however, such a statement requires some qualification. To begin, note that while in English and many other languages, active sentences are more basic than their passive counterparts, there is no evidence to support such a claim for Tagalog. Rather— as argued by Cena (1977) and De Guzman (1976, 1979)— it is the patient topic voice that is more basic than its actor topic counterpart, or any of the other voices.² That is to say, it is the patient NP—rather than the actor—that is the topic in basic sentences in Tagalog. Note, however, that actorhood and topichood are two of the foremost properties determining the grammatical relation of subject—cf. Keenan (1976c), Givón (1979). Resulting from the basicness of patient topic clauses is thus a mismatch between the two subjecthood properties—and, also, between the two direct object properties, patienthood and being part of the comment. This may be represented diagrammatically as follows:

(2)

ACTOR  PATIENT

TOPIC  COMMENT

SUBJECT PROPERTIES  DIRECT OBJECT PROPERTIES

Thus, in the basic patient topic clause in Tagalog, subject properties fail to pick out a single NP as subject, distributing instead over the two direct (non-oblique) NPs in the clause. Hence—as is argued by Schachter (1976, 1977)—the notion of subject is not well defined in Tagalog. Analogous arguments with respect to the non-viability of the
notion of direct object are presented in Gil (to appear b).

Thus, the two primary grammatical relations—subject and direct object—are not well defined in Tagalog. An immediate corollary of this is that the grammatical relations hierarchy governing the syntax and semantics of distributive numerals and other distributive expressions—cf. sections 4.3 and 5.1.2—cannot be operative in Tagalog. With respect to quantifier scope, at least, it would seem to be the case that a thematic relations hierarchy is operative instead: as reported in Gil (1982b), patient NPs tend to have wider scope than actor NPs, regardless of the voice of the clause. More generally, patient NPs may be characterized as more strongly referential than actor NPs. Tagalog is thus a **patient prominent language**—in the sense defined in Gil (1982b, to appear b):

(3) A language is **patient prominent** to the extent that it exhibits the following properties:

a. Prominence of passive clauses:

(i) textual;

(ii) grammatical;

(iii) psycholinguistic;

b. Greater referential strength of patients than actors.

Patient prominence is thus a typological property which different languages may exhibit to different degrees. Most of the world's languages are not patient prominent; however, patient prominence would appear to be typical of the Austronesian language family. In Gil (1982b) it is suggested that of the two patient prominence properties, prominence of passive clauses is the cause (rather than the result) of the greater
referential strength of patients: the Austronesian facts are argued
to support a version of the Sapir-Whorf principle of linguistic rela-
tivity. In subsequent sections of this chapter, we shall see how the
syntax and semantics of distributive numerals in Tagalog is governed,
inter alia, by the patient prominence typology.

6.1.2 Categorical Ill-Definedness

A second salient feature of Tagalog grammar is the relative ill-
definedness of various syntactic categories. Distinctions that are
central to the grammars of English and other languages—e.g. common/
determined noun phrase, noun/noun, noun/verb—are less well motivated
in Tagalog; in fact, it is arguably the case that Tagalog does not dis-
tinguish at all between common and determined noun phrases.

Most NPs in Tagalog consist, minimally, of a case marking preposi-
tion plus a nominal phrase, e.g. ang lalaki "top man" and ng manok "dir
chicken" in (1a). At first glance, ang and ng appear to be articles:
as pointed out above they have particular values of definiteness as-
associated with them; moreover, they are historically analyzable as con-
sisting of articles a and na plus ligature ng (Foley 1976:25-27). Syn-
chronically, however, ang and ng are not articles, but, rather, case
marking prepositions like their oblique counterparts sa, para sa, etc.

Thus, each of the four NPs in sentences (1a-d) is a so-called "bare NP":
while in English the occurrence of bare NPs is highly constrained—cf.
*Man killed chicken in house for boy, in Tagalog, bare NPs may occur
much more frequently.

Consider, now, the following sentences:

160
In sentence (4a), *ang libro* is a bare NP, unmarked for number, and consequently interpretable as either singular or plural. In (4b), the NP *ang mga libro* contains an optional plural marker *mga*. And in (4c), the NP *ang tatlong libro* contains the numeral *tatlo*. The above three sentences indicate that in Tagalog—as opposed to English—bare NPs have the same privileges of occurrence as NPs modified by quantifying expressions. Thus, while in English, the difference in grammaticality between *I read book* and *I read three books* provides motivation for assigning the expressions *book* and *three books* to different syntactic categories—common and determined noun phrases respectively, sentences (4a-c) above provide no motivation for assigning the corresponding Tagalog expressions *ang libro* and *ang tatlong libro* to different syntactic categories. More generally, Tagalog would not appear to offer any reason whatsoever for distinguishing between syntactic categories of common and determined noun phrases.6

Quite obviously, if Tagalog does not distinguish between common and determined noun phrases, it cannot have a syntactic category consisting of expressions combining with common noun phrases to yield
determined noun phrases—namely, determiners. But of what syntactic category, then, are the numerals, e.g. *tatlo* "three"? In section 3.2.1, it was argued that numerals may be nouns, adjectives, or verbs. As for Tagalog, Llamzon (1976:117) suggests that "the numerals are a subclass of the nouns".

A more careful look reveals a close affinity between numerals, adjectives, and nouns in Tagalog. In the following sentences, the noun *libro* "book" is modified by a numeral *tatlo* "three"—(5a), an adjective *bago* "new"—(5b), and a nominal phrase *kay Pedro* "obl Pedro"—(5c). The three modifier-noun constructions are syntactically parallel, the modifier occurring before the noun, in construction with the ligature enclitic *-ng*.

(5) a. Binasa ko ang tatlong libro
    read-PT dir-1sg top three-lig book
    "I read the three books"

b. Binasa ko ang bagong libro
    read-PT dir-1sg top new-lig book
    "I read the new book(s)"

c. Binasa ko ang kay Pedrong libro
    read-PT dir-1sg top obl Pedro-lig book
    "I read Pedro's book(s)"

Thus, numerals, like adjectives, are subclasses of nouns in Tagalog. In particular, adnominal distributive numerals are also a subclass of the nouns. It will consequently come as no surprise to find—section 6.5.2—other distributive nominal expressions in Tagalog.

The relative ill-definedness of the various nominal modifier categories—numerals, adjectives, and nouns—is mirrored by the
similarity between nominal and verbal phrases in Tagalog. Consider the following sentences (adapted from Schachter and Otanes 1972:62):

(6) a. Yumaman ang artista
got:rich-AT top actress
"The actress got rich"

b. Artista ang yumaman
actress top got:rich-AT
"The actress got rich"

(7) a. Nagluto ng pagkain ang artista
cooked-AT dir food top actress
"The actress cooked food"

b. Artista ang nagluto ng pagkain
actress top cooked-AT dir food
"The actress cooked food"

Basic sentences in Tagalog—and the four above—are of the general form Predicate + ang + Topic. Most often—as is the case in (6,7a)—the topic contains a noun (e.g. artista), while the predicate consists of an intransitive or transitive verbal phrase (e.g. yumaman or nagluto ng pagkain). However, as indicated in (6,7b), the topic may sometimes contain a verbal phrase (e.g. yumaman or nagluto ng pagkain), while the predicate may consist of a noun (e.g. artista). Thus, although clearly distinguishable in terms of their morphology, both nominal and verbal phrases may occur in either topic or comment syntactic slots. In section 6.3.2, we shall see that in spite of their nominal nature, distributive numerals may also occur in either topic or comment syntactic roles, and, in fact, may actually be verbalized to various extents.
This concludes our survey of the salient syntactic features of Tagalog. As was shown in this section, several basic grammatical notions characteristic of English and many other languages—e.g. the grammatical relations of subject and direct object, and the syntactic distinction between common and determined noun phrases—are not viable constructs in the grammar of Tagalog, while other grammatical notions—e.g. the distinction between the syntactic categories of noun, adjective, and verb are less central to the grammar of Tagalog than to that of English. In the remainder of this chapter, we shall make use of these observations in our discussion and analysis of distributive numerals in Tagalog.

6.2 The Morphology of Tagalog Distributive Numerals

Like other Philippine languages (Blake 1907), Tagalog has a large variety of distributive numeral series formed by morphological processes from the cardinal numeral series.

6.2.1 Adnominal Distributive Numerals

Tagalog grammar books list the following four series of adnominal distributive numerals:

<table>
<thead>
<tr>
<th>Cardinal Numerals</th>
<th>Adnominal Distributive Numerals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Series 1</td>
</tr>
<tr>
<td>a. 1 isa</td>
<td>tigisa</td>
</tr>
<tr>
<td>b. 2 dalawa</td>
<td>tigdalawa</td>
</tr>
<tr>
<td>c. 3 tatlo</td>
<td>tigtatlo</td>
</tr>
<tr>
<td>d. 4 apat</td>
<td>tigapat</td>
</tr>
<tr>
<td>e. 5 lima</td>
<td>tiglima</td>
</tr>
<tr>
<td>f. 6 anim</td>
<td>tiganim</td>
</tr>
<tr>
<td>g.</td>
<td>7</td>
</tr>
<tr>
<td>h.</td>
<td>8</td>
</tr>
<tr>
<td>i.</td>
<td>9</td>
</tr>
<tr>
<td>j.</td>
<td>10</td>
</tr>
<tr>
<td>k.</td>
<td>11</td>
</tr>
<tr>
<td>l.</td>
<td>$10^2$</td>
</tr>
<tr>
<td>m.</td>
<td>$10^3$</td>
</tr>
<tr>
<td>n.</td>
<td>$10^4$</td>
</tr>
<tr>
<td>o.</td>
<td>$10^5$</td>
</tr>
</tbody>
</table>

Series 1-3 are formed by prefixation of *tig*-, series 4 by prefixation of *man*-; Series 1 and 4 are formed only by prefixation; series 2 and 3 are formed also by reduplication: series 2 by reduplication of the first syllable of the numeral prior to prefixation, series 3 by reduplication of the first two syllables following prefixation. (See Schachter and Otanes 1972 for a more precise formulation of the rules for reduplication.) Series 1 and 2 would appear to be the most productive, whereas series 3 is restricted to the first four numerals, and series 4 to powers of ten. The four series of adnominal numerals appear to occur in the same environments, and corresponding numerals in each series are apparently synonymous: in spite of extensive efforts, I was not able to elicit any syntactic or semantic differences between the various adnominal distributive numeral series--except for a general preference for the use of series 1 or 2 forms. In this dissertation, all examples of adnominal distributive numerals in Tagalog are of series 1 forms.

In addition to the cardinal numerals listed in (8), Tagalog has an alternative series of cardinal numerals of Spanish origin; the
constraints governing the use of native or Spanish numeral are lexical/cultural (see Schachter and Otanes 1972 for details) and need not concern us here. Of interest to us, however, is the existence of a series of adnominal distributive numerals formed from these Spanish numerals by reduplication of the first syllable and subsequent prefixation of \textit{tig}- --the same morphosyntactic strategy used to form series 2 native adnominal distributive numerals:

(9) Adnominal Distributive Numerals of Spanish Origin in Tagalog

\begin{tabular}{ll}
Cardinal Numerals & Adnominal Distributive Numerals \\
\hline
a. 1 uno & - \\
b. 2 dos & tigdodos \\
c. 3 tres & tigtretres \\
d. 4 kwatro & tigkwakwatro \\
e. 5 singko & tigsisingko \\
f. 6 sais & tigsasais \\
g. 7 siyete & tigsisiyete \\
h. 8 otso & tigootso \\
i. 9 nuwebe & tignunuwebe \\
j. 10 diyes & tigdidiyes \\
\end{tabular}

This series of adnominal distributive numerals attests to the productivity of the morphological processes forming distributive numerals in Tagalog.

6.2.2 Adverbial Distributive Numerals

Adverbial distributive numerals are formed by reduplication of the first two syllables of the corresponding cardinal numeral:
(10) Adverbial Distributive Numerals in Tagalog

<table>
<thead>
<tr>
<th>Cardinal Numerals</th>
<th>Adverbial Distributive Numerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 1 isa</td>
<td>isa-isa</td>
</tr>
<tr>
<td>b. 2 dalawa</td>
<td>dala-dalawa</td>
</tr>
<tr>
<td>c. 3 tatlo</td>
<td>tatlu-tatlo</td>
</tr>
<tr>
<td>d. 4 apat</td>
<td>apat-apat</td>
</tr>
<tr>
<td>e. 5 lima</td>
<td>lima-lima</td>
</tr>
<tr>
<td>f. 6 anim</td>
<td>anim-anim</td>
</tr>
<tr>
<td>g. 7 pito</td>
<td>pito-pito</td>
</tr>
<tr>
<td>h. 8 walo</td>
<td>walo-walo</td>
</tr>
<tr>
<td>i. 9 syam</td>
<td>syam-syam</td>
</tr>
<tr>
<td>j. 10 sampu</td>
<td>sampu-sampu</td>
</tr>
<tr>
<td>k. 11 labing isa</td>
<td>labi-labing isa</td>
</tr>
</tbody>
</table>

Note that the rule of reduplication used to form adverbial distributive numerals is the same as that used to form series 3 adnominal distributive numerals; while for series 3 adnominal distributive numerals it applies to the cardinal numeral prefixed with *tig-*, for adverbial distributive numerals it applies to the cardinal numeral itself. ¹⁰

Recall, from the introduction to chapter 2, that various sources provide different names for the numeral series in (10), e.g. "distributive numerals" (Blake 1925), "distributive-collectives" (Lopez 1937), and "grouping numerals" (Schachter and Otanes 1972). In accordance with our analysis of distributive numerals in chapter 5, we may now settle the terminological (and perhaps, also, substantive) confusion regarding such numerals in the literature, by referring to them, as per section 5.2, as adverbial distributive numerals.

167

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
6.2.3 Distributive Numerals Qualifying Verbs

Tagalog has at its disposal two strategies for forming numerals qualifying verbs: prefixation of maka- or a construction involving beses "times" (from Spanish veces):

(11) a. lima $\rightarrow$ makalima
    b. lima $\rightarrow$ limang beses
      "five" "five times"

However, only the second strategy may be used to form distributive numerals qualifying verbs:

(12) a. lima $\rightarrow$ *tigmakalima, *makatiglima
    b. lima $\rightarrow$ tiglimang beses
      "five" "five-dist times"

Tagalog distributive numerals qualifying verbs are syntactically adverbia-
al, taking the adverbial marker nang, like adverbial distributive numerals qualifying nouns.

6.2.4 Non-Ordinary Distributive Numeral Series

In section 3.1.2, we saw that various absolute numeral series could be combined, e.g. restrictive ordinal numerals in Pangasinan. In Tagalog, there exist two series of non-ordinary distributive numerals resulting from the combination of a marking of distributivity with a marking of another non-cardinal numeral series. First, there is a series of distributive restrictive numerals, yielding forms such as titigatlo "only three each":

168
(13) DISTRIBUTIVE

\[
\begin{array}{c}
\text{tatlo} \\ \downarrow \\ \text{tatlo}
\end{array}
\rightarrow
\begin{array}{c}
\text{tigatlo} \\ \downarrow \\ \text{titigatlo}
\end{array}
\] RESTRICTIVE

Blake (1925:29) cites several forms in this series, but other sources do not list them, and one speaker whom I consulted was unacquainted with them. 11

Next, there is a series of distributive ordinal numerals, e.g. 

_ika-ikatlo_ "every third":

(14) DISTRIBUTIVE

\[
\begin{array}{c}
\text{tatlo} \\ \downarrow \\ \text{ikatlo}
\end{array}
\rightarrow
\begin{array}{c}
\text{tatlu-tatlo} \\ \downarrow \\ \text{ika-ikatlo}
\end{array}
\] ORDINAL

While distributive restrictive numerals are formed—like adnominal distributive numerals—by prefixation of _tig_, distributive ordinal numerals are formed—like adverbial distributive numerals—by reduplication of the first two syllables. Again, forms in this series are cited by Blake (1970:244, 1925:26), but no other sources that I am aware of. Note that the semantics of distributive ordinal numerals necessarily involves phrasal distributivity of the numeral over its classifier head. (In the following examples, the ligature _-ng_ is suggested to constitute the morphosyntactic realization of the logical constituent UNITS; this assumption is not defended here, and little hinges on it.)

(15) a. [ikatlo ng] araw

Collectively third (units of)
"Third day"

169
b. [ika-ikatlo → ng] araw
   Individually third (units of) day
   "Every third day"

While in (15a) the units of day possess the "third" property collectively (and hence, presumably, consist of a singleton day possessing the said property), in (15b) each unit possesses the "third" property individually (and hence there is a set of several days possessing the said property).

6.3 The Syntax of Tagalog Distributive Numerals

After our survey of Tagalog grammar in 6.1, and the morphology of Tagalog distributive numerals in 6.2, we may now begin our examination of the ways in which distributive numerals participate within the larger grammatical patterns of Tagalog. In section 6.3, we shall consider two topics pertaining to the syntax of distributive numerals in Tagalog—two aspects of distributive numerals in Tagalog distinguishing them from distributive numerals in many other languages. These two topics concern the two main features of Tagalog grammar discussed in the introductory section: the non-viability of the grammatical relations of subject and direct object (section 6.1.1), and the relative ill-definedness of the various syntactic categories (section 6.1.2).

6.3.1 Case Marking and Thematic Relations

As was shown in sections 4.3 and 5.1.2, the occurrences of distributive numerals and other markers of distributivity in most languages is governed by a grammatical relations hierarchy, whereby such markers are more likely to occur within direct object NPs than within subject NPs. However, as we saw in section 6.1.1, Tagalog has no viable
grammatical relations of subject or direct object. Thus, the question arises what factors govern the occurrence of distributive numerals in Tagalog instead of grammatical relations.

The two speakers consulted differed considerably in their grammaticality judgements of constructions involving adnominal distributive numerals in various positions.\textsuperscript{12} The first speaker was very liberal, accepting NPs containing adnominal distributive numerals whenever there was another plural NP to be distributed over. We shall not concern ourselves any further with this speaker in this section. The second speaker, however, had a complex set of constraints on the occurrence of adnominal distributive numerals; these constraints were sensitive to case marking and thematic relations. These constraints reflected the following hierarchy—with distributive numerals becoming more acceptable within NPs occurring lower down in the hierarchy:

(16) Hierarchy Governing Adnominal Distributive Numerals in Tagalog

\[
\begin{align*}
\{ \text{ang A} \} & > \{ \text{ang S} \} > \text{ng P} > \{ \text{ng A} \} \\
\{ \text{ang P} \} & > \{ \text{sa O} \} > \text{ng S}
\end{align*}
\]

(In 16 above, "A" denotes the actor of a transitive verb, "P" the patient of a transitive verb, "S" the actor of an intransitive verb, and "O" an oblique NP. Ang, ng, and sa are the case marking prepositions introduced in section 6.1.1.)

We shall now review the evidence supporting the above hierarchy. First, sentences (17)-(19), with actor topic verb, support the sub-
hierarchy \text{ang A} > \text{sa O} > \text{ng P}:
(17) ang A > ng P

a. Nakakita ng tigdalawang babae ang tatlong lalaki sa Luneta

saw-AT dir dist-two-lig woman top three-lig man obl Luneta

"Three men saw [two women each] in the Luneta"\(^{13}\)

b. *Nakakita ng dalawang babae ang tigtatlong lalaki

saw-AT dir two-lig woman top dist-three-lig man

sa Luneta

obl Luneta

"[Three men each] saw two women in the Luneta"

(18) ang A > sa O

a. Nakakita ng aksidente ang tatlong lalaki sa tigdalawang

saw-AT dir accident top three-lig man obl dist-two-lig

larawan

picture

"Three men saw an accident in [two pictures each]"

b. *Nakakita ng aksidente ang tigtatlong lalaki sa

saw-AT dir accident top dist-three-lig man obl

dalawang larawan

two-lig picture

"[Three men each] saw an accident in two pictures"

(19) sa O > ng P

a. Nakakita ng tigdalawang babae si Juan sa tatlong bahay

saw-AT dir dist-two-lig woman top Juan obl three-lig house

"Juan saw [two women each] in three houses"

b. *Nakakita ng dalawang babae si Juan sa tigtatlong bahay

saw-AT dir two-lig woman top Juan obl dist-three-lig house

"Juan saw two women in [three houses each]"

Each pair of sentences above differs only in the location of the

distribution prefix *tig-*; successive pairs of sentences differ with

172
respect to the pairs of NPs between which distributivity may obtain. Thus, for example, the pair of sentences in (17) shows that an adnominal distributive numeral may occur within a patient NP marked with ng forcing it to distribute over an actor NP marked with ang—as in (17a), but not vice-versa—as in (17b). As a result, the pair of sentences in (17) indicates that ang A is higher on the hierarchy than ng P. Similarly, the pair of sentences in (18) shows that ang A is higher than sa O, and the pair of sentences in (19) shows that sa O is higher than ng P. Altogether, then, these three pairs of sentences support the subhierarchy ang A > sa O > ng P.

In similar fashion, sentences (20)–(22), with patient topic verb, support the subhierarchy ang P > sa O > ng A:

(20) ang P > ng A

a. Nakita ng tigtatlong lalaki ang dalawang babae sa Luneta saw-PT dir dist-three-lig man top two-lig woman obl Luneta "[Three men each] saw two women in the Luneta"

b. *Nakita ng tatlong lalaki ang tigdalawang babae sa Luneta saw-PT dir three-lig man top dist-two-lig woman obl Luneta "Three men saw [two women each] in the Luneta"

(21) ang P > sa O

a. Nakita ni Juan ang dalawang babae sa tigtatlong bahay saw-PT dir Juan top two-lig woman obl dist-three-lig house "Juan saw two women in [three houses each]"

b. *Nakita ni Juan ang tigdalawang babae sa tatlong bahay saw-PT dir Juan top dist-two-lig woman obl three-lig house "Juan saw [two women each] in three houses"
(22) sa O \(\times\) ng A

a. Nakita ng tigtatlong lalaki si Maria sa dalawang bahay saw-PT dir dist-three-lig man top Maria obl two-lig house
"[Three mean each] saw Maria in two houses"

b. *Nakita ng tatlong lalaki si Maria sa tigdalawang bahay saw-PT dir three-lig man top Maria obl dist-two-lig house
"Three men saw Maria in [two houses each]"

Sentences (23)–(25) with benefactive topic verb present a slightly more complex picture. While (23) and (24) support the position of \(\text{ang} \ O\) higher up on the hierarchy than either ng A or ng P, the equal acceptability of both sentences in (25) would appear to indicate that ng A and ng P are equally positioned on the hierarchy.

(23) ang O \(\times\) ng A

a. Ipinaluto ng tigtatlong lalaki ang dalawang babae cooked-BT dir dist-three-lig man top two-lig woman
   ng pagkain
dir food
"[Three men each] cooked food for two women"

b. *Ipinaluto ng tatlong lalaki ang tigdalawang babae cooked-BT dir three-lig man top dist-two-lig woman
   ng pagkain
dir food
"Three men cooked food for [two women each]"

(24) ang O \(\times\) ng P

a. Ipinaluto ni Juan ang dalawang babae ng tigtatlong cooked-BT dir Juan top two-lig woman dir dist-three-lig
   tasa ng bigas
cup of rice
"Juan cooked [three cups of rice each] for two women"
b. *Ipinaluto ni Juan ang tigdalawang babae ng tatlong cooked-BT dir Juan top dist-two-lig woman dir three-lig tasa ng bigas cup of rice "Juan cooked three cups of rice for [two women each]"

(25) ng A ~ ng p^{14}

a. Ipinaluto ng tatlong lalaki si Maria ng tigdalawang cooked-BT dir three-lig man top Maria dir dist-two-lig tasa ng bigas cup of rice "Three men cooked [two cups of rice each] for Maria"

b. Ipinaluto ng tigtatlong lalaki si Maria ng dalawang cooked-BT dir dist-three-lig man top Maria dir two-lig tasa ng bigas cup of rice "[Three men each] cooked two cups of rice for Maria"

Hitherto, we have considered only sentences with two direct (non-oblique) arguments, A and P. Sentences (26) and (27) below, establish the position of S in the hierarchy. While, as expected, (26) with locative topic verb shows that \textit{ang} O ranks higher than \textit{ng} S--cf. (23) and (24), the similar judgements of both sentences in (27) with actor topic verb indicate, perhaps a little surprisingly, that \textit{ang} S and \textit{sa} O are of equal strength on the hierarchy.

(26) ang O > ng S

a. Pinangalingisaan ng tigtatlong lalaki ang dalawang ilog fished-LT dir dist-three-lig man top two-lig river "[Three men each] fished in two rivers"

b. *Pinangalingisaan ng tatlong lalaki ang tigdalawang ilog fished-LT dir three-lig man top dist-two-lig river "Three men fished in [two rivers each]"
(27) \( \text{ang } S \sim \text{ sa } O \)

a. *Nangingisda ang tatlong lalaki sa tigdalawang ilog
   fished-AT top three-lig man obl dist-two-lig river
   "Three men fished in [two rivers each]"

b. *Nangingisda ang tigtatlong lalaki sa dalawang ilog
   fished-AT top dist-three-lig man obl two-lig river
   "[Three men each] fished in two rivers"

We have now demonstrated the validity of the entire hierarchy in
(16), with the exception of the position of \( \text{ng } P \) above \( \text{ng } A \) and \( \text{ng } S \):
sentences (25) provided no indication of any inequality between \( \text{ng } P \)
and \( \text{ng } A \), while \( \text{ng } P \) and \( \text{ng } S \) are, by definition, prevented from occurring in the same sentence. In order to complete the hierarchy in (16),
we shall examine the possibility of NPs containing adnominal distributive
numerals distributing externally over conjoined verbal phrases:

(28)

a. \( \text{ang } A \rightarrow V \)
   *Nangyakap at nanghalik ni Maria ang tigtatlong lalaki
   hugged-AT and kissed-AT dir Maria top dist-three-lig man
   "[Three men each] hugged and kissed Maria"

b. \( \text{ang } P \rightarrow V \)
   *Yinakap at hinalikan ni Juan ang tigdalawang babae
   hugged-PT and kissed-PT dir Juan top dist-two-lig woman
   "Juan hugged and kissed [two women each]"

c. \( \text{ang } O \rightarrow V \)
   *Finangingisdaan at pinamamangkaan ni Juan ang tigtatlong
   fished-LT and sailed-LT dir Juan top dist-three-lig
   ilog
   river
   "Juan fished and sailed in [three rivers each]"
d. ang S $\rightarrow$ V

*Nangingisda at namamangka ang tigtatlong lalaki sa ilog fished-AT and sailed-AT top dist-three-lig man obl river
"[Three men each] fished and sailed in the river"

e. sa O $\rightarrow$ V

*Nangingisda at namamangka si Juan sa tigtatlong ilog fished-AT and sailed-AT top Juan obl dist-three-lig river
"Juan fished and sailed in [three rivers each]"

f. ng P $\rightarrow$ V

*Nangingisda at namahalik si Juan ng tigdalawang babae hugged-AT and kissed-AT top Juan dir dist-two-lig woman
"Juan hugged and kissed [two women each]"

g. ng A $\rightarrow$ V

*Nangingisda at namahalik si Maria ng tigtatlong lalaki hugged-PT and kissed-PT top Maria dir dist-three-lig man
"[Three men each] hugged and kissed Mary"

h. ng S $\rightarrow$ V

*Nangingisdaan at pinamamangkaan ng tigtatlong lalaki fished-LT and sailed-LT dir dist-three-lig man
ang ilog

top river
"[Three men each] fished and sailed in the river"

The above sentences show that while NPs marked with ang and sa may not distribute externally over conjoined verbal phrases---(28a-c), NPs marked with ng may---(28f-h). Observe, however, that while (28g,h) are completely grammatical, (28f) was judged to be of questionable grammaticality. That is to say, while ng A and ng S may distribute freely over a conjoined verbal phrase, ng P may not do so so readily. This difference
accordingly justifies the placement of ng P above ng A and ng S in the hierarchy in (16).

Sentences (17)-(28) thus provide complete support for the hierarchy in (16). This hierarchy may be decomposed into two subhierarchies as follows:

(29) a. Case Marking Subhierarchy

\[
\text{ang N} \triangleright \text{sa N} \triangleright \text{ng N}
\]

b. Thematic Relations Subhierarchy

\[
P \triangleright \begin{cases} A \\ O \end{cases} \triangleright S
\]

Of these two subhierarchies, the case marking subhierarchy is the dominant one, accounting for most of the judgements of sentences (17)-(28). Thus, for example, the speaker in question categorically rejected any instance of an adnominal distributive numeral occurring within an NP marked with ang. However, two items in the hierarchy in (16) deviate from the case marking subhierarchy in (29a)--these are ang S, occurring lower than ang A, ang P, and ang O, and ng P, occurring higher than ng A and ng S. These two exceptions to the case marking subhierarchy may be accounted for by the thematic relations subhierarchy in (29b).

As discussed in Gil (to appear b), each of these two systems--case marking and thematic relations--govern a number of grammatical processes in Tagalog. Thus, for example, case marking affects, among other things, word order, relativization, and definiteness, while thematic relations govern, inter alia, word order, reflexivization, and choice of topic. Of particular interest, however, are the particular rankings of various items within each of the two subhierarchies. To begin, note that the
case marking subhierarchy in (29a) is identical to that governing definiteness: as noted in section 6.1.1, NPs marked with *ang are interpreted as definite, NPs marked with *sa as either definite or indefinite, and NPs marked with *ng as indefinite. Subhierarchy (29a) thus indicates that adnominal distributive numerals are more likely to occur within indefinite NPs than within definite NPs—a result that is reminiscent of similar constraints on English postnominal each, cf. (53b) section 4.3.1 *Two men carried these suitcases each.16 Turning, now, to the thematic relations subhierarchy in (29b), we find that it provides further support for the patient prominence of Tagalog—as discussed in section 6.1.1. To wit, just as patient NPs are more likely to have wider scope than actor NPs, so correspondingly, adnominal distributive numerals are more likely to occur within actor NPs than within patient NPs. Thus, like quantifier scope, the occurrence of adnominal distributive numerals is governed by the patient prominence of Tagalog.

To summarize, note that, in fact, both subhierarchies in (29) appear to govern quantifier scope in Tagalog: the case marking hierarchy by dint of the natural association between definiteness and wide scope, and the thematic relations hierarchy due to the patient prominence of Tagalog. Sentences (17)-(28) and the hierarchy in (16) accordingly indicate that in spite of the absence of viable grammatical relations in Tagalog, quantifier scope and the occurrence of markers of distributivity are governed by one and the same hierarchy—just as was argued to be the case for English and other languages in section 4.3. Although the particular hierarchy governing these two features may differ from language to language (a grammatical relations hierarchy for English vs. hierarchy (16) based on case marking and thematic relations for Tagalog),
the existence of a single hierarchy governing both quantifier scope and
the occurrence of markers of distributivity would appear to be a likely
candidate for a linguistic universal. One attempt to formulate such a
universal is made in section 9.3.17

6.3.2 Cross Categorial Variation

The next topic we shall consider is that of variation in the synt-
tactic categories of distributive numerals in Tagalog. As noted in sec-
tion 6.1.2, syntactic categories are relatively ill-defined in Tagalog;
as a result, expressions of one syntactic category may often occur in
positions characteristic of a different syntactic category. Not surpris-
ingly, this is true also of distributive numerals. As adequate descrip-
tion of cross categorial variation in the syntax of distributive numerals
in Tagalog would require a fuller investigation than I have yet been able
to undertake. The goal of this section is more modest: merely to pro-
vide a sampling of the great syntactic richness of constructions involv-
ing distributive numerals in Tagalog, thereby pointing the way towards
possible future avenues of research.

We may begin by noting that the distinction between adnominal and
adverbial distributive numerals is not as hard and fast as might have
been implied: while I have come across no instances of adnominal
distributive numerals occurring in adverbial position, adverbial distribu-
tive numerals may, occasionally, occur adnominally. Thus, for example,
the adverbial distributive numeral tatlu-tatlo occurs adverbially in
(30a) but adnominally in (30b) and (30c); all three sentences may be
glossed, roughly, as "The men went to the party in threes" (but with
different pragmatic structure):
(30) a. Pumanta sa parti ang mga lalaki nang tatlu-tatlo
   went-AT obl party top pl man adv dist-three

b. ?Pumanta sa parti ang tatlu-tatlong lalaki
   went-AT obl party top dist-three-lig man

c. Tatlu-tatlong lalaki ang pumanta sa parti
   dist-three-lig man top went-AT obl party

Note that the adverbial distributive numeral in adnominal position is
judged better in predicate position, in (30c), than in topic position,
in (30b). I have no explanation for this fact, nor for the fact that
in very many other instances, adverbial distributive numerals in
adnominal position are rejected as ungrammatical. 18

Constructions such as (30c) in which a distributive numeral occurs
in predicate position are widespread. Thus, for example, corresponding
to our favorite "suitcase sentence" (31a) with adnominal distributive
numeral within the topic NP, is (31b) with adnominal distributive numeral
within an NP in predicate position:

(31) a. Dinala ng dalawang lalaki ang tigtatlong maleta
carried-PT dir two-lig man top dist-three-lig suitcase

(= (1a) chapter 2 = (1a), (20a) chapter 5)

b. Tigtatlong maleta ang dinala ng dalawang lalaki
dist-three-lig suitcase top carried-PT dir two-lig man

Sentence (31b) may be glossed roughly as follows: "The carrying by two
men was of three suitcases each". A particularly interesting construc-
tion may be obtained from (31b) by deleting the main verb dinala and
case marking preposition ng:

(32) Tigtatlong maleta ang dalawang lalaki
dist-three-lig suitcase top two-lig man

181
Sentence (32) reads, roughly, "The two men are three suitcases each"; a more felicitous translation, however, would be "The two men are to get three suitcases each". Sentence (32) exemplifies the so-called recipient topic construction discussed by Schachter and Otanes (1972: 211-212): in lieu of a lexical verb, the construction is interpreted as containing an understood verb "to get"; the topic NP is subsequently interpreted as the recipient, and the NP in predicate position as the patient.

So far, we have considered examples of adnominal and adverbal distributive numerals in predicate position: in spite of their occurrence in a typically verbal slot, the distributive numerals—as well as the NPs in which they appear—retain their nominal morphology. In other cases, however, distributive numerals occurring in predicate position may be verbalized. In the following examples, from Blake (1925: 278), a distributive numeral occurs as main verb; in each example, the verbal affixes on the distributive numeral are underlined:

(33) Dinalaralawang sinugo ni Jesu Cristo ang mga apostles
dist-two-PT-lig sent-PT dir Jesus Christ top pl apostle
"Jesus Christ sent out the apostles two by two"

(34) Magtigisa kayo ng saging
dist-one-AT top-2pl dir banana
"Give each one one banana"

(35) Papagtigisahin mo sila ng saging
dist-one-AT dir-2sg top-3pl dir banana
"Let each one take a banana"

It is difficult, from a few examples such as those given above, to infer any syntactic and semantic regularities governing verbalized distributive

182
Numerals in Tagalog. I have not yet investigated constructions such as these in any detail; this would seem to me to be a worthy topic for future research.

Examples (30)-(35) discussed in this section show that distributive numerals in Tagalog may occur in a wide variety of syntactic environments. In doing so, they provide further support for the analysis of distributivity presented in chapter 4; in particular, for the claim that distributivity may obtain over a variety of syntactic domains. Thus, while distributive numerals in (31) and (32) induce distributivity between pairs of NPs, distributive numerals in (33)-(35) force distributivity between an NP and a verbal phrase. At the same time, examples (30)-(35) also reflect a language particular property of Tagalog, namely, the relative ill-definedness of various syntactic categories, and the possibility that expressions of one syntactic category may occur in positions characteristic of another.

6.4 The Semantics of Tagalog Distributive Numerals

The semantics of distributive numerals in Tagalog follows, for the most part, the universal observations governing distributive numerals made in chapter 5. In this section we shall consider two aspects of the semantics of distributive numerals in Tagalog. The first topic to be considered—disjointness and collectivity—pertains to some of the finer points concerning the interpretation of constructions involving adnominal distributive numerals, which were touched upon in chapter 5 but not discussed in sufficient detail. The second topic—double distributive constructions—deals with one area in which the semantics of distributive numerals in Tagalog differs from that of other languages, reflecting, again, the patient prominence typology.
6.4.1 **Disjointness and Collectivity**

In (4) section 2.3.3, (23) section 5.1.2 and elsewhere in chapter 5, possible classes of interpretations of various sentences containing distributive numerals are defined in terms of five semantic parameters. Of these five parameters, some are directly determined by the various relations of distributivity that may obtain, while others are less directly determined by these relations—cf. footnote 2 chapter 5. Consider, for example, the following Tagalog sentence (the actor topic counterpart of (1a) chapter 2 = (1a), (20a) chapter 5 = (31a)), along with its closest English counterpart (= (1),(51a),(52c) chapter 4):

(36) Nagdala ng tigtatlong maleta ang dalawang lalaki carried-AT dir dist-three-lig suitcase top two-lig man

(37) Two men carried three suitcases each

Whether the men acted necessarily individually is determined by whether the patient NP distributes over the actor NP (class A of interpretations); whether there were necessarily several events is determined by whether the patient NP distributes over the verbal phrase (class B of interpretations—not available for English), and whether there may be more than two sets of three suitcases is contingent on the existence of either distributivity over the verbal phrase (class B) or phrase-internal distributivity (class C—not available for English). However, whether the sets of suitcases carried were disjoint, and whether each set was carried individually or collectively is not determined by any of the three possible relations of distributivity obtaining in sentences such as (36). Nevertheless, as indicated by the characterizations of classes A, B, and C of interpretations provided in previous chapters, speakers
of Tagalog, English, and other languages express definite preferences with respect to these two parameters. Let us now briefly examine these preferences.

To do so, we shall define five states of affairs, putative interpretations of sentences (36) and (37). In what follows, the "m_1" denote men, the "s_j" denote suitcases, curly brackets signify that the enclosed s_j were acted upon collectively, and each Roman numeral (equivalently, each line) denotes a separate event.

(38) a. **State of Affairs 1**
   (i) m_1 carried \{s_1, s_2, s_3\}
   (ii) m_2 carried \{s_4, s_5, s_6\}

b. **State of Affairs 2**
   (i) m_1 carried \{s_1, s_2, s_3\}
   (ii) m_2 carried \{s_3, s_4, s_5\}

c. **State of Affairs 3**
   (i) m_1 carried s_1
   (ii) m_1 carried s_2
   (iii) m_1 carried s_3
   (iv) m_2 carried s_4
   (v) m_2 carried s_5
   (vi) m_2 carried s_6

d. **State of Affairs 4**
   (i) m_1 carried s_1
   (ii) m_1 carried s_2
   (iii) m_1 carried s_3
(iv) $m_2$ carried $s_3$
(v) $m_2$ carried $s_4$
(vi) $m_2$ carried $s_5$

e. State of Affairs 5

(i) $m_1$ carried $s_1$
(ii) $m_1$ carried $s_2$
(iii) \{m_1, m_2\} carried $s_3$
(iv) $m_2$ carried $s_4$
(v) $m_2$ carried $s_5$

With respect to the number of men, events, and suitcases, at least, each of the above five states of affairs qualifies for each of the three classes A, B, and C of interpretations of sentences (36) and (37). Note, moreover, that each of the five states of affairs may reflect a scope dependency of the patient NP on the actor NP: ng tigtatlong maleta < ang dalawang lalaki or three suitcases each < two men. However, only for the first four states of affairs is the actor NP ang dalawang lalaki or two men interpreted individually: in state of affairs 5, both men cooperate in the carrying of suitcase $s_3$. Hence, only for the first four states of affairs does the patient NP distribute over the actor NP: ng tigtatlong maleta \rightarrow ang dalawang lalaki or three suitcases each \rightarrow two men. Turning, now, to the two semantic parameters of interest to us here, disjointness and collectivity, we may note that disjointness obtains only in states of affairs 1 and 3--in states of affairs 2, 4, and 5, suitcase $s_3$ is carried by both men; collectivity obtains only in states of affairs 1 and 2--in states of affairs 3, 4, and 5, each suitcase was carried individually.
Let us now examine whether states of affairs 1-5 above are possible interpretations of Tagalog sentence (36)—and, by way of contrast, English sentence (37). In table 1 below, the judgements of two speakers of Tagalog—denoted "S₁" and "S₂"—are presented, alongside the judgements of typical speakers of English: the letter "T" denotes that the appropriate sentence—(36) or (37)—is judged to be true for the given state of affairs, the letter "F" denotes that the appropriate sentence is judged false for the given state of affairs, and the symbol "?" denotes that the speaker could not decide whether the appropriate sentence was true or false for the given state of affairs. Beside each state of affairs it is also indicated whether it reflects distributivity of the patient NP over the actor NP, and whether disjointness and collectivity obtain—summarizing the discussion of the preceding paragraph, for each of reference.

<table>
<thead>
<tr>
<th>State of Affairs</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributivity</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Disjointness</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Collectivity</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tagalog S₁</td>
<td>T</td>
<td>T</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Tagalog S₂</td>
<td>T</td>
<td>F</td>
<td>?</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>English</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>F</td>
</tr>
</tbody>
</table>

**Table 1:** Disjointness and Collectivity in Tagalog and English

The results of Table 1 indicate that with respect to disjointness and collectivity, the set of possible interpretations of Tagalog **tigtatlo**
is more restricted than that of the corresponding English expression
three ... each. As is indicated by the unacceptability of state of
affairs 5, both tig- and each force the patient NP to distribute over
the actor NP.\textsuperscript{19} However, whereas English each forces neither disjoint-
ness nor collectivity—as evidenced by the acceptability of states of
affairs 1-4, Tagalog tig- tends to induce a preference for disjoint and
collective interpretations: for the first speaker, tig- forces col-
lectivity—cf. the unacceptability of states of affairs 3-5, while for
the second speaker tig- forces disjointness—cf. the unacceptability of
states of affairs 2, 4, and 5, and induces a preference for collectivity
—cf. the doubtful judgement of state of affairs 3. Thus, the interpre-
tation of the Tagalog adnominal distributive numeral tigatlo differs in
an interesting way from that of the corresponding English discontinuous
expression three ... each—even in those cases, e.g. in (36) above,
where tig-, like each, induces clausal distributivity over another NP.

The judgements of the two speakers of Tagalog reflect a consider-
able degree of idiolectal variation. Nevertheless, the above facts
reflect a general tendency for distributive numerals to force disjoint-
ness and collectivity—one that I have observed in several other lan-
guages.\textsuperscript{20} I have no explanation for this fact; nor am I convinced that
it need be accounted for semantically, rather than—as suggested in
footnote 2 chapter 5—by a theory of pragmatics.

6.4.2 Double Distributive Constructions

The second semantic topic we shall consider is one in which
Tagalog differs from other languages; here we shall provide an analysis
of constructions involving distributive numerals in Tagalog not to
exemplify a more general property of distributive numerals, but, instead, to highlight a particular grammatical characteristic of Tagalog.

Double distributive constructions were introduced in section 5.1.2; for example, Tagalog (28a)--reproduced below as (39a), and its actor topic counterpart (39b):

(39) a. Dinala ng tigdalawang lalaki ang tigtatlong maleta carried-PT dir dist-two-lig man top dist-three-lig suitcase

b. Nagdala ng tigtatlong maleta ang tigdalawang lalaki carried-AT dir dist-three-lig suitcase top dist-two-lig man

In most languages, such constructions involve phrasal distributivity within each of the two NPs. However--as pointed out in footnote 8 chapter 5--three Tagalog speakers consulted rejected the interpretations involving distributivity within both NPs, offering instead the class of interpretations represented in (40) below:21

(40) [[[2-DIST → UNITS] MAN] CARRIED [[[3-DIST UNITS] SUITCASE]]

Sets of two men carried (the same) three suitcases

Thus, both sentences in (39) are interpreted as involving a single relation of distributivity--obtaining phrase-internally, within the actor NP. The corresponding relation of distributivity within the patient NP may not obtain.

The interpretation of (39) may be accounted for straightforwardly in terms of the patient prominence of Tagalog. As per (3b), patients are more strongly referential than actors. One criterion or referential strength, discussed previously, is quantifier scope; as argued in Gil (1982b), patients tend to have wider scope than actors. Of relevance here, however, is a second criterion of referential strength--uniqueness
of reference. An NP referring to a single set is more strongly referential than an NP referring to several such sets. In the case at hand, the patient NP refers to a unique set of three suitcases, while the actor NP, by dint of the phrase-internal distributivity, fails to refer to a unique set of two men. Interpretation (40) of (39) thus reflects the greater referential strength of patients than actors—indeed independently of the voice of the verb and the concomitant case markings. In doing so, it provides—alongside the hierarchy governing the occurrence of distributive numerals proposed in section 6.3.1—another instantiation of the patient prominence of Tagalog.22

6.5 Other Distributive Expressions in Tagalog

This concludes our discussion of distributive numerals per se in Tagalog. However, it would be unfortunate if we left Tagalog without briefly considering some other types of expressions closely related to distributive numerals.

6.5.1 Distributive Quantifier Expressions

Unlike other languages—e.g. Georgian and Maricopa—Tagalog does not form distributive expressions from non-numerical quantifiers: corresponding to marami "many", for example, there is no *tigmarami or *mara-marami. However, Tagalog does form several distributive interrogative quantifier expressions from ilan "how many":

(41) a. tigilan (adnominal distributive, series 1)
  "how many each"

b. tigilan (adnominal distributive, series 2)
  "how many each"

c. ilan-ilan (adverbial distributive)
  "how many at a time"
d. titigilan (distributive restrictive)
   "only how many each"

e. ikaikailan (distributive ordinal)
   "every how many"

The above forms occur in Blake (1925); no other source that I am aware
of acknowledges their existence. Blake provides several examples of
sentences containing distributive expressions formed from ilan, among
which are the following:

(42) Tigilan kun pagbibigay mo ng salapi sa mga bata mo
dist-how:many top gave-AT dir-2sg dir money obl pl boy dir-2sg
   "How much money did you give to each of your boys?" (p. 222)

(43) Ikaikailang araw ang lagnat
dist-ord-how:many-lig day top fever
   "Every how many days is the fever?" (p. 221)

(44) Ilanilanin kong bilangin
dist-how:many-PT dir-1sg-lig count-PT
   "How many shall I count at a time?" (p. 278)

I have not investigated the syntax of such constructions in any detail.
However, as indicated in section 9.1, distributive interrogative
quantifiers are quite widespread cross-linguistically; Tagalog is by no
means peculiar in this respect.

6.5.2 Distributive Monetary Expressions

Somewhat less common cross-linguistically, however, is a series
of distributive numismatic expressions; some of these are:

(45) a. pera → mamera
      "a centavo" → "a centavo each"

b. piso → mamiso
      "a peso" → "a peso each"
Other forms are given in Blake (1925) and Schachter and Otanes (1972: 210).

As noted in section 6.1.2, numerals are a subclass of nouns; it is thus not surprising to find that a strategy used to form distributive numerals is generalized to apply also to other subcategories of noun. It is, moreover, worth observing that the particular strategy used to form distributive monetary expressions—prefixation of man- (with morphophonemic adjustments)—is that used to form distributive numerals from powers of ten—cf. (8) series 4. As noted by Hurford (1975:51), powers of ten are generally the most noun-like numerals—and, of course, they are the most likely denominations for a system of coinage. Although extremely restricted lexically, the existence of a class of distributive nouns in Tagalog underscores the nominal nature of numerals, and, ipso facto, distributive numerals in Tagalog. In subsequent chapters, we shall encounter much more productive strategies for forming non-numerical distributive expressions—namely, distributive adjectives and adverbs in Georgian, and distributive verbs in Maricopa.

6.5.3 A Nascent Distributive Numeral Formative: bawat

From the discussion so far, it is apparent that Tagalog enjoys an abundance of strategies for forming distributive numerals: prefixation of tig- or man-, reduplication, or combinations thereof. Yet, surprisingly, Tagalog seems to be searching for additional strategies for forming distributive numerals, one of which involves the use of bawat.

Like English each, Russian kazdij, and other examples cited in section 4.3.2, bawat is both a universal quantifier and a marker of distributivity. Thus, corresponding to English sentences (52a) and (52c)
of section 4.3.1 with each—reproduced below in (46)—are the analogous constructions involving bawat in Tagalog, indicated in (47):

(46) a. Each of two men carried three suitcases
    b. Two men carried three suitcases each

(47) a. Dinala ng bawat isa sa dalawang lalaki ang tatlong maleta
carried-PT dir each one obl two-lig man top three-lig
suitcase

b. Dinala ng dalawang lalaki ang bawat tatlong maleta
carried-PT dir two-lig man top each three-lig suitcase

While in (46,47a) each and bawat are universal quantifiers, in (46,47b) they function instead as markers of distributivity.

In spite of the apparent syntactic parallel between English (46) and Tagalog (47), there is an interesting semantic difference between the two pairs of sentences. While English (46a) and (46b) are synonymous, Tagalog (47a) and (47b) are not: (47a) is synonymous with the two English sentences in (46), whereas (47b) is synonymous with Tagalog sentence (31a)—with adnominal distributive numeral tigtatlong instead of bawat tatlong. Thus, while both (47a) and (47b) have class A interpretations, (47b) has only those interpretations in which disjointness or collectivity obtain (depending on the individual speaker—cf. section 6.4.1). In other words, (47b) entails (47a), but not vice versa.

Observe, now, that syntactically, bawat appears to be more deeply embedded within its NP ang bawat tatlong maleta in (47b) than each is within its NP three suitcases each in (46b). In fact, Blake (1925:221)—who is the only source I am aware of to acknowledge such constructions
--suggests that bawat tatio forms a syntactic constituent, specifically a distributive numeral with "about the same meaning and use" as the corresponding adnominal distributive numeral tigtatlo. The data I have gathered support Blake's conclusion in most part: numerals preceded by bawat appear to have similar syntax and semantics to the corresponding numerals prefixed with tig-. Thus, for example, sentences (47b) and (31a) are synonymous--while, in other instances, constructions with bawat followed by a numeral may--unlike corresponding constructions with English each--involve phrase-internal distributivity. We may conclude, then, that Tagalog has at its disposal an alternative series of adnominal distributive numerals: bawat isa, bawat dalawa, bawat tatio, etc.

Constructions involving Tagalog bawat thus provide an indication of one possible diachronic source for adnominal distributive numerals--namely, a universal quantifier marking distributivity. Following is a hypothetical scenario indicating how a universal quantifier EACH may undergo reanalysis as an adverbial marker of distributivity, and, subsequently, as a distributive numeral formative:

(48)  a. 2 MEN [s EACH CARRIED 3 SUITCASES]
     ↓
  b. 2 MEN [vp EACH CARRIED 3 SUITCASES]
     ↓
  c. 2 MEN CARRIED [np EACH 3 SUITCASES]
     ↓
  d. 2 MEN CARRIED [num EACH 3] SUITCASES

Structure (48a) consists of a topic NP plus a sentential comment with a pronominal quantifier in subject position. Structure (48b) is derived
from (48a) by the well motivated syntactic process of downgrading (cf.
Givón 1979), whereby topic is reanalyzed as subject, and erstwhile sub-
ject becomes a grammatical marker—in the case at hand, of distributivity.
Structure (48b) is attested in many languages—e.g. English (52b)
chapter 4 Two men each carried three suitcases. Structure (48c) is de-
derived from (48b) by further downgrading of the marker of distributivity,
from the VP to the NP within it; it is also attested in many languages—
e.g. English (46b) Two men carried three suitcases each. While in
English (46b), each and three do not occur adjacently, in other lan-
guages the corresponding expressions may conceivably do so. (Such, per-
haps, is the case in Persian (2d) chapter 2, where har yek "every one"
and se "three" occur adjacently in the NP har yek se jāmedān.) From
here, it is but a short step towards reanalyzing the universal quanti-
fier as forming a constituent with the neighboring numeral—resulting
in an adnominal distributive numeral, as in the structure (48d). This,
quite probably, is how adnominal distributive numerals formed with bawat
developed in Tagalog.24
Footnotes - Chapter 6

1 Most of the Tagalog data cited in this chapter were elicited from Emily Cruz during September 1980 in Manila, and from Eleanor Vasco during October 1980-February 1981 in Los Angeles. Although both are speakers of a standard Manila dialect, in several instances they provided conflicting syntactic and semantic judgements. The data are supplemented with a number of examples cited from the existing literature.

2 The basicness of the patient topic voice is supported by textual, grammatical, and psycholinguistic evidence. Bloomfield (1917), Naylor (1975) and others show that the patient topic voice occurs at least as frequently in texts as the actor topic voice. Cena (1977) and De Guzman (1976, 1979) argue that the patient topic voice is grammatically more basic, citing both its morphosyntactic simplicity and the existence of a wide range of constructions--e.g. definite patients, relativized patients, sentential patients--in which it is obligatory. Finally, Tucker (1971), Cena (1977), and Segalowitz and Galang (1978) cite psycholinguistic evidence also supporting the basicness of the patient topic voice in Tagalog. This evidence is surveyed in more detail in Gil (1982b).

3 The same is true also for at least two other Austronesian languages, Batak and Buginese. However, as is the case for languages subject to the usual grammatical relations quantifier scope hierarchy, the relative preferences of the various asymmetric interpretations is secondary to the general preference for symmetric over asymmetric interpretations, as noted in section 4.2.1.

4 The forms of the case marking prepositions may vary for different NPs, e.g. proper nouns. Pronominal NPs occur without any case marking preposition, the case of the NP being reflected by the form of the pronoun itself, e.g. ako "top-lsg", ko "dir-lsg" (cf. (4) below).

5 To appreciate this, note the following data:

(i) a. *Bumasa ang bata ang libro
    read-AT top boy top book
b. *Bumasa ng bata ng libro
    read-AT dir boy dir book
c. *Bumasa ng bata ang libro
    read-AT dir boy top book
d. Bumasa ang bata ng libro
    read-AT top boy dir book
  "A/the boy read a/the book"
(ii) a. *Binasa  ang bata  ang libro
    read-PT top boy top book

b. *Binasa  ng bata  ng libro
    read-PT dir boy dir book

c. *Binasa  ang bata  ng libro
    read-PT top boy dir book

d. Binasa  ng bata  ang libro
    read-PT dir boy top book

"A/the boy read a/the book"

If ang and ng were articles, we would expect there to exist sentences—
e.g. (i/a), (ii/a)—in which both NPs are marked with ang (cf. English
The boy read the book), and sentences—e.g. (i/b), (ii/b)—in which both
NPs are marked with ng (cf. English A boy read a book). Instead, the
only available sentences in Tagalog are those—e.g. (i/d), (ii/d)—in
which one NP is marked with ang and the other with ng (cf. English
The boy read a book, A boy read the book). (Sentences (i/c) and (ii/c)
are grammatically well formed but semantically anomalous, entailing
that a/the book is the actor and a/the boy is the patient.) The distribu-
tion of ang and ng in (i) and (ii) above is thus more characteristic
of (nominative and accusative) case markings than of (definite and in-
definite) articles.

6 Note that the distinction between common and determined noun
phrases in English is, in any case, only viable for count nouns—cf.
Carlson (1977), Allen (1980). We may, accordingly, say that while
English distinguishes between count and mass nouns, Tagalog treats all
nouns as mass. This, in turn, may account for Schachter and Ota
es' (1972:111) observation that "the number distinctions of English...have
a more central role in the language than the number distinctions of
Tagalog." Thus, for example, while the English nominal plural marker
-s is obligatory wherever it is semantically appropriate, its Tagalog
counterpart mga is optional, and, in fact, may not occur in construc-
tions with a numeral:

(i) *Binasa  ko  ang tatlong  mga libro
    read-PT dir-lsg top three-lig pl book
    "I read the three books"

7 Thus, Blake (1925:223) writes that "the relation between noun and
adjective is very close", adding (p. 296) that "any descriptive adjective...
may also be used as a noun...and almost any noun is capable of
being used as an adjective." With regard to numerals, he observes
(p. 219) that "the cardinals and fractions as pronouns and adjectives,
have in general the same use as nouns or indefinite pronominal adjecti-
tives respectively."

8 Sources differ with respect to the forms of adnominal distributive
numerals in Tagalog. Blake (1907,1925) lists series 1, series 2 for
numerals beginning with "five", series 3 for "three" and "four", and
series 4. Lopez (1937) provides series 1, 2, and 4 but not 3. Schachter and Otanes (1972) list series 1 for the first four numerals, and series 2 and 3. And Llamanz (1976) provides only series 2. Some sources provide variant forms for some of the distributive numerals, e.g. tigalawa and tigalawa for "two" and tigalalo and tigatalo for "three".

I am aware of two putative counterexamples to this claim in the literature. Lopez (1937) calls series 2 forms "distributive plurals", but does not provide any explanation for this seemingly semantically motivated terminology. Schachter and Otanes (1972) claim that series 3 forms are used in the recipient topic construction discussed in section 6.3.2. I was not able to obtain any support through elicitation either for Lopez' choice of terms, or for Schachter and Otanes' syntactic characterization of series 3 forms. However, in view of the considerable amount of idiolectal variation in the morphology, syntax and semantics of constructions involving distributive numerals in Tagalog, I would not be willing to risk a categorial denial of the existence of possible syntactic and semantic differences between the various distributive numeral series.

Reduplication is a very productive morphological process in Tagalog in general, and for Tagalog numeral series in particular. In addition to contributing to the formation of series 2 and 3 of adnominal distributive numerals, distributive numerals of Spanish origin, and adverbial distributive numerals, reduplication is also used to form restrictive numerals, e.g. dadalawa "only two", excessive numerals, e.g. data-datalawa "even two" (Schachter and Otanes 1972:214), and indefinite numerals, e.g. libu-libo "thousands" (Schachter and Otanes 1972:214). The use of reduplication to form distributive and other numeral series in Tagalog and other languages is taken up again in section 9.2.

Blake (1925:29) also cites numeral forms where reduplication of initial syllable applies to the output of reduplication of initial two syllables, e.g. from Isa "one":

(i) isa → isa-isa → iisa-isa

One would, perhaps, expect these to be adverbial distributive restrictive numerals, meaning, say, "only in ones", or "only one by one". Instead, such forms have what Blake characterizes as an "enhanced" restrictive meaning, and are not distributive.

Interestingly, the non-distributive nature of forms such as iisa-isa would appear to be consistent with the incompatibility of "only" and phrasal distributivity, as evidenced by (17b,d) chapter 5, cf. footnote 5.

There is, quite often, a tendency in the linguistic literature for analyses of "exotic" languages to work nice and neatly, while analyses of English turn out problematic, typically riddled with exceptions and idiolectal variation. It gives me satisfaction to report that my
own experience with Tagalog and other "exotic" languages is that they are every bit as "messy" as English—if, only, they are scrutinized carefully enough. In particular, whenever I have had access to more than one speaker of a language (as is the case for Tagalog this chapter and Georgian in the next), numerous conflicting judgements have ensued.

This is, of course, no reason to abandon the enterprise of investigating distributive numerals, or the particular methodology involving elicitation of syntactic and semantic judgements from native speakers. On the contrary, patterns of idiolectal variation may themselves be noteworthy objects of investigation. Thus, for example, several points of similarity suggest themselves between the idiolectal variation evinced by the two speakers of Tagalog discussed in this section, and patterns of variation in the acceptability of constructions involving English each discussed in section 4.3.1.

13 (The Luneta is a park in central Manila.) The English translations of the Tagalog sentences in the remainder of this subsection are structured so as to closely reflect the syntax of the original Tagalog sentences: each NP with an adnominal distributive numeral in Tagalog is rendered by an NP with postnominal each in square brackets. Of course, many of the English translations are just as bad as their Tagalog source sentences.

14 The pair of sentences in (25) show that when a verb is in a voice other than the actor or patient topic, actor and patient NPs are—contra (i/b) and (ii/b) footnote 5—identically case marked, with ng. While in the case at hand there is no question of the men being cooked by the cups of rice, in other instances, where ambiguity may arise, it is resolved by word order, actors obligatorily preceding patients.

15 Thus, for example, in addition to the appropriate sentences in (17)–(28), the speaker in question also rejected sentence (2a) chapter 2, and sentences (1a)=(20a), (15a), (28a), and (57b) chapter 5. These sentences were, of course, accepted by the other speaker of Tagalog mentioned at the beginning of this section.

16 However, as noted by Hudson (1970:232–233), definite NPs may sometimes—contra (53b) chapter 4—distribute over other NPs, as in the following example:

(i) Every man carried the suitcase given to him

Thus, while the constraint against adnominal distributive numerals in NPs marked with ang may correspond to parallel constraints on postnominal each, sentences such as (i) above render less surprising the acceptability of adnominal distributive numerals in NPs marked with ang for other speakers of Tagalog.

17 Unfortunately, even for Tagalog, this hypothesis is rendered very difficult to test, by the complexity of the hierarchy in (16), as
well as by the existence of rampant idiolectal variation in syntactic and semantic judgements. Another difficulty is caused by the fact that what evidence I have available concerning quantifier scope indicates that it is governed more by thematic relations—as per subhierarchy (29b), and less by case marking—as per subhierarchy (29a). This would seem to reflect an at least partial mismatch between the factors governing quantifier scope and the occurrence of adnominal distributive numerals. In order to adequately test such an hypothesis, a much more extensive survey of a large population of speakers would appear to be required.

The unacceptability of adverbial distributive numerals in adnominal positions in most instances provides one reason why not to characterize forms such as tatlu-tatlo in (30b) and (30c) simply as adnominal, and not—as is suggested above—as adverbial forms in adnominal guise. That is to say, the use of tatlu-tatlo as an adnominal distributive numeral has a distinctly derived flavour, which would be obscured were it to be characterized as purely and simply adnominal.

Note that an analogous question arises with respect to the use of verbs as nouns and vice-versa, in sentences such as (6b), (7b), (30c): should tatlu-tatlong lalaki in (30c), for example, be considered a verb because it occurs in predicate position? Schachter and Otanes (1972) argue convincingly that it should not—and their argument applies equally well to instances discussed in this section of distributive numerals "wandering" from one syntactic slot to another.

These two speakers thus accepted only class A of interpretations for sentence (36)—to the exclusion of classes B and C. However, for other sentences they proved more ready to accept interpretations involving phrasal distributivity—e.g. the double distributive constructions considered in the next section.

Among these languages are Georgian, Maricopa, Turkish, and Bulgarian. (The actual data are not provided in this dissertation for lack of space.) Conversely, adverbial markers of distributivity, e.g. Italian ciascuno, Hebrew kol had, appear not to force disjointness of collectivity—like English each. Interestingly, the two verbal markers of distributivity that I have had occasion to investigate—Batak marsi— and Maricopa -xpar, behave like distributive numerals rather than adverbial markers of distributivity, tending to force disjointness and collectivity. (With respect to Maricopa, at least, this is not surprising, since, as argued in chapter 8, numerals are verbs, and hence distributive numerals are in fact a subclass of distributive verbs.)

A fourth speaker—the one described in detail in section 6.3.1—rejected these sentences as ungrammatical, since they involve an adnominal distributive numeral occurring within an NP marked with ang, contra the hierarchy represented in (16).
22. Thus, both the syntax and the semantics of distributive numerals reflect the patient prominence of Tagalog. However, as noted in section 5.1.2 and footnote 7 thereof, the semantics of other constructions involving distributive numerals in Tagalog appears not to be consistent with patient prominence. Much further research is required to elucidate the semantics of clausal distributivity in Tagalog, and its interaction with case marking and thematic relations.

23. I have, however, encountered a number of exceptions to this generalization. First, unlike tigtatlo, bawat tatlo may not induce external distributivity over conjunctions—hence, while (36a) chapter 5 with tigtatlo—reproduced below as (i/a)—is grammatical, its counterpart in (i/b) with bawat tatlo is not:

(i) a. Kumain ang isang lalaki ng tigtatlong apol at saging
    ate-AT top one-lig man dir dist-three-lig apple and banana

    b. *Kumain ang isang lalaki ng bawat tatlong apol at saging
    ate-AT top one-lig man dir each three-lig apple and banana

    "One man ate three apples and three bananas"

Secondly, the speaker—discussed in section 6.3.1—who rejected adnominal distributive numerals formed with tig- within NPs marked with ang accepted numerals preceded by bawat in the same environments. Much further investigation of the syntax and semantics of numerals preceded by bawat is needed before an adequate comparison of both types of distributive numeral constructions can be provided.

24. Of course, the above scenario clearly does not account for the evolution of other distributive numeral series in Tagalog and other languages. In footnote 7 chapter 9 it is suggested that the cross-linguistic prevalence of reduplication as a strategy for forming distributive numerals may be accounted for diachronically in terms of iconicity.
Chapter 7

7. Distributive Numerals in Georgian

The second language whose distributive numerals we shall examine in detail is Georgian. Compared to Tagalog, Georgian has been considerably less extensively studied; moreover, much of the existing literature is relatively inaccessible in the west—some of the more readily available descriptions of Georgian include Tchenkeli (1958), Aronson (1969, 1970), Vogt (1971), Harris (1981), and Holisky (1981). Virtually nothing, however, exists in print on distributive numerals in Georgian—all that I have come across are a few lines in Cikobava (1967:38) and Holisky (1981:127); moreover, nothing whatsoever that I am aware of has been written about related non-numerical distributive expressions, which, as we shall see, are quite widespread. In this chapter, we shall consider selected issues pertaining to the morphology, syntax, and semantics of distributive numerals and related expressions in Georgian. Our main theme will be that in Georgian, adnominal and adverbial distributive numerals do not form coherent well-defined syntactic categories, but, rather, constitute subclasses of distributive adjectives and adverbs respectively. In Georgian, then, there is little motivation for an independent analysis of distributive numerals as such; instead, an investigation such as the present one ought concern itself with the broader category of distributive expressions in general. This, then, will be the scope of this chapter.¹
7.1 Some Features of Georgian Grammar

As in the preceding chapter, we shall find it advantageous to preface our analysis of distributive numerals with a survey of some of the more salient grammatical characteristics of the language in question. As we shall see, the syntax and semantics of distributive numerals in Georgian are affected by the same two grammatical systems—case marking and thematic/grammatical relations on the one hand, syntactic categorial distinctions on the other—that were argued in the preceding chapter to govern the syntax and semantics of distributive numerals in Tagalog. However, Georgian is typologically quite distinct from Tagalog; hence, the effect of these two systems on constructions involving distributive numerals in Georgian is, also, quite different.

7.1.1 Case Marking

Word order in Georgian is relatively free, with SOV order perhaps the most basic. The case marking system is a split ergative one, in which the choice of case marking is governed by various verbal features, some lexical, others inflectional. For example, in (1) below, the case marking of the noun is determined by the aspect of the verb:

(1) a. K'acebi mërian
   men-nom sing-3pl
   "The men are singing"

   b. K'acebma imëreres
      men-erg sang-3pl
      "The men sang"

In (2), the case marking of both NPs is determined by the lexical category of the verb, as well as by its aspect: although all three sentences embody the same thematic relations, the distinction between agent and
The patient is coded in a different way in each sentence—with ergative vs. nominative cases in (2a), nominative vs. dative in (2b), and dative vs. nominative in (2c):

(2) a. K'acebma čantebi c'aiyes
    men-erg suitcases-nom carried-3pl
    "The men carried the suitcases"

b. K'acebi čantebs iyeben
    men-nom suitcases-dat lift-3pl
    "The men are lifting the suitcases"

c. K'acebs čantebi miakvt
    men-dat suitcases-nom carry-3pl
    "The men are carrying the suitcases"

A fourth strategy for coding the same thematic relations is perhaps less surprising; this is passivization, as in (3)—the passive of (1a):

(3) Čantebi k'acebit c'aYebulía
    suitcases-nom men-instr carry-part-sg
    "The suitcases were carried by the men"

In view of such variability in case marking, the question arises whether Georgian possesses well-defined grammatical relations of subject and direct object. Anderson (1976) argues that in many languages, ergative case marking is a relatively superficial phenomenon, and that languages may possess a (syntactically and semantically motivated) grammatical relation of subject, even if it is obscured by a variety of different case markings. In this chapter, we shall see that constructions involving markers of distributivity support such a claim for Georgian. Thus, for example, we shall see that in sentences such as (2), the agent NPs are, in fact, also subjects, even they may occur with
ergative, nominative, or dative case markings. With respect to the existence of well defined grammatical relations, at least, Georgian thus resembles English more closely than it does Tagalog.

7.1.2 Nouns, Adjectives, and Numerals

Like Tagalog, however, Georgian fails to make a number of syntactic categorial distinctions characteristic of English. To begin Georgian provides no motivation for distinguishing between common and determined noun phrases: since there are no indefinite or definite articles, bare noun phrases—as indicated below—enjoy the same privileges of occurrence as nouns modified by adjectives, demonstratives, numerals, or any combination thereof:

(4) a. Bavšvi mirboda
    boy-nom ran-3sg
    "A/the boy ran"

b. Lamazi bašvi mirboda
    pretty-nom boy-nom ran-3sg
    "A/the pretty boy ran"

c. Sami bašvi mirboda
    three-nom boy-nom ran-3sg
    "(The) three boys ran"

d. Es bašvi mirboda
    this-nom boy-nom ran-3sg
    "This boy ran"

e. Es sami lamazi bašvi mirboda
    this-nom three-nom pretty-nom boy-nom ran-3sg
    "These three pretty boys ran"

This conclusion is supported—as was the case for Tagalog in the previous chapter—by the fact that nominal plural marking is much less
pervasive in Georgian than in English—cf. the singular form of the noun bavšvi in construction with a numeral in (4c). That is to say, Georgian treats nouns like bavšvi "boy" in (4) more as mass than as count. Thus, there is little or no reason to assume that bavšvi in (4a) and es sami lamazi bavšvi in (4e) do not belong to the same syntactic category—an undifferentiated nominal category including both bare and determined noun phrases.

Again, if Georgian does not distinguish between common and determined noun phrases, it cannot possess a syntactic category of determiner—and, perforce, numerals cannot belong to such a category. In Tagalog, we saw that numerals, like adjectives, form a subclass of nouns. In Georgian, we shall see that adnominal numerals are adjective-like—but that adjectives are, on the whole, somewhat more differentiated from nouns than is the case in Tagalog.

Case marking provides prima facie support for the syntactic affinity of numerals and adjectives, to the exclusion of nouns. Consider the following paradigm:

(5) Georgian Case Marking

a. Nominative: sami lamazi bavšvi
b. Ergative: samma lamazma bavšvma
c. Vocative: samo lamazo bavšvo
d. Genitive: sami lamazi bavšvis
e. Instrumental: sami lamazi bavšvit
f. Dative: sam lamaz bavšvs
g. Adverbial: sam lamaz bavsvat "three" "pretty" "boy"
As revealed in (5) above, the seven cases of Georgian fall into two
groups with respect to the behaviour of numerals, adjectives, and nouns.
The first group consists of nominative -i, ergative -ma, and vocative
-o; these three suffixes occur on numerals, adjectives, and nouns. The
second group consists of the remaining cases--genitive -is, instrumental
-it, dative -s, and adverbial -at; these four suffixes occur only on
nouns, not on numerals or adjectives. If a numeral or adjective modi-

fies a noun in one of these four cases, it occurs either with the
nominative suffix -i (if its head noun is in the genitive or instrument-
al cases), or without any case marking suffix whatsoever (if its head
noun is in the dative or adverbial cases). Thus, with respect to the
second group of cases--indicated in (5d-g)--numerals and adjectives
form a natural class, to the exclusion of nouns.

Case marking is, of course, a somewhat risky criterion for the
formulation of syntactic generalizations--especially in Georgian. How-
ever, in subsequent sections, we shall see that in this case at least,
surface morphology offers a faithful reflection of underlying syntax.
Thus, in section 7.2, we shall see that adnominal numerals and adjec-
tives constitute a natural class with respect to the morphological
process of reduplication, while in section 7.3, we shall see that they
form a natural class with respect to syntactic constructions involving
recursive stacking.

Although basically adjectival, numerals may also occur in derived
forms, as adverbs or as nouns: 4

(6) a. Sami bavšvi mirboda
    three-nom boy-nom ran-3sg
    "(The) three boys ran"
b. Bavšvebi samat mirboda
   boys-nom three-adv ran-3sg
   "Some/the boys ran threely"

c. Bavšvebis sameuli mirboda
   boys-gen three-nml-nom ran-3sg
   "A/the threesome of boys ran"

d. Bavšvebi sameulat mirboda
   boys-nom three-nml-adv ran-3sg
   "Some/the boys ran threesomely"

All of the above four sentences are roughly synonymous. While in (6a) sami is adnominal, samat in (6b) is adverbial, with adverbial case marking suffix -at. (Although (6b) is judged to be awkward, the corresponding constructions with adverbial distributive numerals are perfectly grammatical.) In (6c,d) the numeral stem sam occurs with a nominalizing suffix -eul, resulting in a noun stem sameul "threesome". In (6c) sameuli, in the nominative case, enters into a genitival construction with bavšvebis, while in (6d) sameulat--like samat in (6b)--is adverbial. In subsequent sections we shall see that each of the above four numeral forms--sami, samat, sameuli, and sameulat--has distributive counterparts, i.e. distributive numerals of adjectival (adnominal), adverbial, and nominal nature.

7.2 Reduplication and Distributivity

We are now in a position to embark on our study of distributive numerals and related expressions in Georgian. As we have already seen, distributive numerals in Georgian are formed by reduplication, e.g. sami "three-nom", sam-sami "three-dist-nom". However, reduplication is a very productive morphological process in Georgian, applying not only to
numerals but also to adjectives—e.g. md²ime "heavy-nom", md²im-md²ime, 
adverbs—e.g. prtxilat "carefully", prtxil-prtxilat, and, occasionally, 
also verbs—e.g. mic'imá "moved-3sg", mic'ı-mic'imá. Moreover, in almost 
all instances, the semantic effect of reduplication is to form a 
distributive expression from one that is otherwise not necessarily 
interpreted as distributive. Thus, distributive numerals in Georgian 
do not form a coherent syntactic–semantic class; rather, adnominal 
distributive numerals form a subclass of distributive adjectives, and 
adverbial distributive numerals constitute a subclass of distributive 
adverbs. The goal of this section is, accordingly, to provide a unified 
semantic analysis of reduplication in Georgian—wherever it may occur 
throughout the language. Over and beyond its immediate contribution 
towards the study of Georgian grammar, the unified semantic analysis of 
reduplication proposed herein will be argued to provide strong addition-
al support for the universally oriented analysis of distributive num-
erals presented in chapter 5.

7.2.1 Distributive Adjectives

Many, perhaps a majority of adjectives, may undergo stem reduplic-
cation. The constraints determining which adjectives may undergo re-
duplication and which others may not are partly phonological and partly 
semantic—with what would appear to be a substantial residue of idio-
syncratic lexical exceptions.

To begin, there would appear to be a strong tendency for "short" 
adjectives—those whose stem consists of one or two syllables—to permit 
reduplication, and for "long" adjectives—those whose stem consists of 
three or more syllables—to disallow reduplication. Some examples:
(7) a. didi didi-didi
   "large" (1 syllable stem)
   b. uzarmazari *uzarmazar-uzarmazari
      "gigantic" (4 syllable stem)

(8) a. ubralo ubral-ubralo
    "simple" (2 syllable stem)
   b. ac'ec'ili *ac'ec'il-ac'ec'ili
      "complicated" (3 syllable stem)

(9) a. axali axal-axali
    "new" (2 syllable stem)
   b. tanamedrove *tanamedrov-tanamedrove
      "modern" (4 syllable stem)

(10) a. c'k'viani c'k'vian-c'k'viani
     "clever" (2 syllable stem)
   b. nič'ieri *nič'ier-nič'ieri
      "talented" (3 syllable stem)

(11) a. bevri bevri-bevri
    "many" (1 syllable stem)
   b. ramodenime *ramodenim-ramodenime
      "several" (4 syllable stem)

Within each of the above five pairs, there is no plausible semantic
factor permitting reduplication in one case while disallowing it in the
second; the relevant factor would seem instead to be phonological—
namely, number of syllables. 6

Certain well defined semantic classes of adjectives, however,
permit or disallow reduplication regardless of the number of syllables.
Thus, for example, nationality adjectives may not undergo reduplication,
even if short:
Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
of Georgian adjectives. However, several cases remain of reduplication or non-reduplication not accounted for by the above factors. Further investigation may reveal whether other hitherto unsuspected factors play a role, or whether these are merely idiosyncratic lexical exceptions.

Semantically, however, the effect of reduplication upon adjectives is quite regular, forcing the reduplicated expression to distribute over its head. Let us consider some examples:

(14) a. Ḷkari at'let'ebi
    bast-nom athletes-nom

b. Ḷkar-Ḷkari at'let'ebi
    fast-dist-nom athletes-nom

(15) a. Md'ime Ḷcantebi
    heavy-nom suitcases-nom

b. Md'ime-md'ime Ḷcantebi
    heavy-dist-nom suitcases-nom

(16) a. K'argi všlebi
    good-nom apples-nom

b. K'arg-k'argi všlebi
    good-dist-nom apples-nom

(17) a. Lamazi q'vavilebi
    pretty-nom flowers-nom

b. Lamaz-lamazi q'vavilebi
    pretty-dist-nom flowers-nom

(18) a. D'virı sačukrebi
    expensive-nom gifts-nom

b. D'vir-d'virı sačukrebi
    expensive-dist-nom gifts-nom
While (14a) permits the athletes to be fast either individually or collectively—imagine a record breaking relay team consisting of three first rate sprinters plus one mediocre one, (14b) forces an interpretation for which each individual athlete is fast. Similarly, (15a) allows for the possibility that the suitcases, although individually light, add up to a heavy load, whereas (15b) rules out this possibility, asserting that each suitcase by itself is heavy. Phrase (16a) may denote a pile of apples containing one or two battered ones if the pile as a whole is sufficiently attractive, but (16b) may refer only to apples every one of which is a satisfactory specimen. In just the same way, (17a) may be said of a meadow blanketed with flowers even if it contains a reasonable proportion of withered or dead ones, whereas (17b) asserts that each individual flower is pretty. Finally, (18a) may be true of a number of individually cheap gifts if there are sufficiently many of them, but its distributive counterpart (18b) forces an interpretation in which each and every gift costs a lot of money.8

Let us now contrast the above examples of distributive adjectives with corresponding constructions involving adnominal distributive numerals:

(19) a. Sami at'let'ebi
three-nom athletes-nom

b. Sam-sami at'let'ebi
three-dist-nom athletes-nom

Whereas (19a) denotes a single set of three athletes, (19b)—under a phrasal distributivity interpretation—refers to several sets of three athletes.
We are now in a position to capture the logical parallel between adnominal distributive numerals such as sam-sami in (19b), and distributive adjectives such as ḍkar-ḍkari in (14b). Following our analysis of adjectives such as English noisy in section 4.2.3 and of phrasal distributivity of adnominal distributive numeral constructions in section 5.1.1.2, we may now represent the two classes of interpretations of examples (14) and (19) as follows:

(20) a. [FAST UNITS] ATHLETE (for (14a)) Collectively fast (units of) athlete

b. [FAST → UNITS] ATHLETE (for (14a) and (14b)) Individually fast (units of) athlete

(21) a. [3 UNITS] ATHLETE (for (19a)) Units numbering three together of athlete

b. [3 → UNITS] ATHLETE (for (19b)) Units numbering three each, of athlete

Whereas (14a), with ordinary adjective ḍkari, may be interpreted either as in (20a) or as in (20b), (14b), with reduplicated adjective ḍkar-ḍkari, may only be interpreted distributively, as in (20b). Similarly, whereas (19a), with ordinary numeral sami, may only be interpreted as in (21a), (19b), with reduplicated numeral sam-sami, may only be interpreted distributively, as in (21b). Examples (20b) and (21b) thus provide a unified semantic analysis of reduplication for adjectives--(20b), and numerals--(21b): in both cases, the reduplicated expression distributes over its classifier head. Thus, in (20b) each athlete unit is fast, while in (21b) each athlete unit numbers three.

The semantics of reduplication in Georgian thus provides strong further support for our analysis of class C interpretations of
constructions involving distributive numerals presented in section
5.1.1.2. Presumably, most linguists or logicians would agree with lit-
tle or no hesitation that the ambiguity or vagueness (it matters not
which) in constructions such as fast athletes or ḥkari at'let'ebi is due
to the adjective either applying collectively to its head or distribut-
ing over it. However, fewer linguists or logicians—certainly fewer
English speaking ones—would be as willing to acknowledge, without
considerable further reflection, that a similar logical relation under-
lies the distinction between ordinary numerals, in constructions such as
three athletes, and distributive numerals, in constructions which may be
glossed as "several sets of three athletes". However, the Georgian
facts provide the crucial clue that this is the case—by using the same
morphological strategy—namely, reduplication, to mark distributivity of
adjectives or of numerals over their heads. In doing so, they support
our analysis of distributive numerals proposed in section 5.1.1.2 as
involving phrasal distributivity over a classifier head—just as is more
obviously the case for adjectival expressions.

Reduplication in Georgian thus underscores the logical unity of
distributivity, obtaining over a variety of different domains. Consider
the following three examples of reduplicated expressions involving
distributivity in Georgian (cf. (1c) chapter 2 = (1b),(20b) chapter 5):

(22) a. Orma k'acma [md'ım-md'ime] → [cantebi] c'aiyo
two-erg man-erg heavy-dist-nom suitcases-nom carried-3sg

b. Orma k'acma [sam-sami] → [cantebi] c'aiyo
two-erg man-erg three-dist-nom suitcase-nom carried-3sg

c. [Orma k'acma] ← [sam-sami cantebi] c'aiyo
two-erg man-erg three-dist-nom suitcase-nom carried-3sg

215
The closest renderings of (22) into English are probably the following:

(23) a. Two men carried individually heavy suitcases
    b. Two men carried suitcases in threes
    c. Two men carried three suitcases each

In the above English sentences, three different morphosyntactic strategies are required in order to force an adjective to distribute over its head (the rather awkward adjectival modifier individually in (23a)), a numeral to distribute over its head (the adverbial distributive numeral in threes in (23b)), and a direct object NP to distribute over a subject NP (postnominal each in (23c)). However, in Georgian (22), the same morphosyntactic strategy—reduplication of a nominal modifier—is employed in all three cases. Reduplication in Georgian thus highlights the semantic parallel between distributivity as it occurs within phrases and clauses, and between adjectives or numerals and their heads.

Let us now consider in more detail the sentence underlying (22a):

(24) Orma k'acma md' im-md'ime  čantebi  c'aiyo
two-erg man-erg heavy-dist-nom suitcases-nom carried-3sg

In (22a) we indicated one particular analysis of (24), in which the distributive adjective md' im-md'ime distributes over its head. However, in light of our analysis of distributive numerals in chapter 5, we might expect sentence (24) to have three classes of interpretations, resulting from different domains of distributivity induced by the distributive adjective:

(25) a. Class A: Clausal Distributivity over Subject NP

Two men carried some/the suitcases; the suitcases carried by each man were (individually or collectively) heavy

216
b. **Class B: Clausal Distributivity over Verbal Phrase**

Two men carried some/the suitcases; the suitcases carried each time were (individually or collectively) heavy

c. **Class C: Phrasal Distributivity over Head**

Two men carried some/the suitcases; each suitcase was heavy

Following the analysis of adnominal distributive numerals in (1) chapter 5, we may represent the above three classes of interpretations as follows:

(26) a. \[[2 \text{ UNITS}] \text{MAN}] \text{[S UNITS] CARRIED} \text{[[HEAVY-DIST \rightarrow UNITS] SUITCASE}}

b. \[[2 \text{ UNITS}] \text{MAN}] \text{[S UNITS] CARRIED} \text{[[HEAVY-DIST \rightarrow UNITS] SUITCASE}}

c. \[[2 \text{ UNITS} \text{MAN}] \text{[S UNITS] CARRIED} \text{[[HEAVY-DIST \rightarrow UNITS] SUITCASE}}

In actual fact, however, the one speaker I consulted with respect to sentences (24) accepted only class C of interpretations, as represented in (22a), (25c), and (26c)—rejecting classes A and B. However, the same speaker also rejected classes A and B of interpretations for the corresponding sentence with distributive numeral am–sam instead of distributive adjective mdzım–mdzime. It is an open question—and one of considerable interest—whether speakers of Georgian who accept classes A and B of interpretations of sentences with distributive numerals also accept classes A and B of interpretations of sentences with distributive adjectives. An affirmative answer to this question would provide a rather striking instance where the logical expressive power of Georgian exceeds that of English.

In section 7.3, we shall consider in detail a specific construction type involving adnominal distributive numerals in Georgian. However, in the remainder of section 7.2, we shall extend the unified
semantic analysis of reduplication in Georgian to account, also, for reduplicated adverbs, verbs, and nouns.

7.2.2 Distributive Adverbs

Reduplication may also apply quite productively to adverbs—though, in the case at hand, I have little information as to whether there exist constraints governing reduplication similar to those shown to exist for adjectives. Again, the semantic effect of reduplication is to force the reduplicated expression to distribute over its classifier head. Thus, for example, corresponding to (27a) with distributive adjective čkar-čkari is the near synonymous (27b) with distributive adverb čkar-čkara: both sentences entail that each individual athlete was fast, ruling out a collective interpretation of the athletes:

(27) a. čkar-čkari at'let'ebi mirbodnen (cf. (14b))
    fast-dist-nom athletes-nom ran-3pl

b. At'let'ebi čkar-čkara mirbodnen
    athletes-nom fast-dist-adv ran-3pl

We may now provide a unified semantic analysis of reduplication for adjectives—as in (27a) and (28a), and for adverbs—as in (27b) and (28b), reflecting, also, the adjectival and adverbial nature of adnominal and adverbial distributive numerals respectively:

(29) a. \([\text{[FAST-DIST } \rightarrow \text{ UNITS]} \text{ ATHLETE}] \text{ RAN} \quad \text{(for (27a))}\)

b. \([\text{[S UNITS } \text{ ATHLETE}] \text{ [FAST-DIST } \rightarrow \text{ UNITS]} \text{ RAN} \quad \text{(for (27b))}\)

(30) a. \([\text{[3-DIST } \rightarrow \text{ UNITS]} \text{ ATHLETE}] \text{ RAN} \quad \text{(for (28a))}\)

b. \([\text{[S UNITS } \text{ ATHLETE}] \text{ [3-DIST } \rightarrow \text{ UNITS]} \text{ RAN} \quad \text{(for (28b))}\)

Contrasting (29b) with (29a), we see that reduplication of an adverb has the same semantic effect—namely, forcing distributivity—as
reduplication of the corresponding adjective. Contrasting (30b) with (29b), we observe the parallel between adverbial distributive numerals and distributive adverbial expressions in general—corresponding to that evident between adnominial distributive numerals and distributive adjectives in (30a) and (29a). Examples (29) and (30) thus provide a unified analysis for reduplicated adjectives and adverbs in Georgian—including both adnominial and adverbial distributive numerals.

In all the examples I have elicited, distributive adverbs—like their adjectival counterparts—distribute only over their classifier heads. However, as is the case for adverbial distributive numerals—cf. English sentence (60) section 5.2—ambiguity may arise with respect to the semantic relation of qualification. Consider the following sentences:

(31) a. K'acebma amocanebi gamoicnes prtxil-prtxilat
    men-erg problems-nom solved-3pl care-dist-adv

b. K'acebma amocanebi gamoicnes sam-samat
    men-erg problems-nom solved-3pl three-dist-adv

In both (31a) and (31b), the adverbial expression may qualify either of the two NPs; this may be represented as follows:

(32) (for (31a))

a. $[[S U] \text{MAN}][[S U] \text{SOLVED}][[S U] \text{PROBLEM}][\text{CAREFULLY-DIST} \rightarrow U]$

b. $[[S U] \text{MAN}][[S U] \text{SOLVED}][[S U] \text{PROBLEM}][\text{CAREFULLY-DIST} \rightarrow U]$

(33) (for (31b))

a. $[[S U] \text{MAN}][[S U] \text{SOLVED}][[S U] \text{PROBLEM}][3-DIST \rightarrow U]$

b. $[[S U] \text{MAN}][[S U] \text{SOLVED}][[S U] \text{PROBLEM}][3-DIST \rightarrow U]$

219
While for (32a) each man acted carefully, for (32b) each problem was solved carefully. Similarly, for (33a) the men acted in threes, whereas for (33b) the problems were acted upon in threes. Sentences (31a) and (31b) accordingly underscore the logical affinity between adverbial distributive numerals and distributive adverbial expressions in general.

In the last two subsections, we have provided a unified semantic analysis of reduplicated adjectives and adverbs in Georgian—according to which the reduplicated expression distributes over its classifier head. Included in the domain of the analysis were distributive numerals of the adnominal and adverbial varieties—as subclasses of distributive adjectives and adverbs respectively. In addition to illuminating the semantics of a productive morphological process in Georgian, our analysis also provided further support for the universally oriented analysis of distributive numerals developed in chapter 5. In the next two subsections, we shall see that reduplication in Georgian may also apply—albeit considerably less productively—to the major syntactic categories of verb and noun; once again, the semantic effect of reduplication will involve a relation of distributivity.

7.2.3 Distributive Verbs

Most verbs in Georgian do not undergo reduplication—e.g. ɣ'ama "ate-3sg", ɣ'am-ɣ'ama; moreover, there are no verbal numerals, which would be likely candidates for reduplication. Holisky (1981:85,121, 126-127) cites a few reduplicated verbal constructions, but characterizes their use as "expressive" rather than as distributive. However, the few instances of verbal reduplication that I have encountered have all involved a semantic relation of distributivity. Consider, for example, the following:
(34) a. Adamiani gamaylda
   man-nom became:tall-3sg
   "The man became tall"

b. Adamiani gamayld-gamaylda
   man-nom became:tall-dist-3sg
   "The man became tall in stages"

c. Adamianebi gamayld-gamayldnen
   men-nom became:tall-dist-3pl
   (i) "The men became tall in stages"
   (ii) "The men each became tall"

In (34b) and (34c) the reduplicated verb distributes over a covert classifier constituent denoting a set of events: for each of several events, the man-men became tall.\textsuperscript{10} In addition, (34c) has a further class of interpretations; for which the reduplicated verb distributes over the subject NP--whereby each individual man became tall. The two classes of interpretations of sentence (34c) may be represented as follows:


As indicated above, reduplicated verbs may induce either phrasal or clausal relations of distributivity; in this respect they would appear to resemble more closely verbs qualified by a distributive numeral--e.g. sam-samjer in (63) section 5.3--than they do reduplicated adjectives or adverbs, which--as shown in sections 7.2.1 and 7.2.2, appear to allow only phrasal distributivity.

In at least one quite remarkable case, the form of a reduplicated verb differs, depending on whether distributivity is phrasal or clausal.\textsuperscript{11} From mic'ia "moved-3sg" may be formed either mic'i-mic'ia or
mic'-mic'ia; while mic'i-mic'ia forces phrasal distributivity, mic'-mic'ia forces clausal distributivity. Consider the following sentences:

(36) a. Man vašlebi mic'ia
   3sg-erg apples-nom moved-3sg
   "He moved the apples"

b. Man vašlebi mic'i-mic'ia
   3sg-erg apples-nom moved-ph:dist-3sg
   "He moved the apples in stages"

c. Man vašlebi mic'-mic'ia
   3sg-erg apples-nom moved-cl:dist-3sg
   "He moved each of the apples separately"

The semantic distinction between (36b) and (36c) may be represented diagrammatically as follows—with "x"'s denoting apples:

(37) a. Phrasal Distributivity—(36b)

   x x
   x
   x

b. Clausal Distributivity—(36c)

   x
   x
   x
   x
   x

Thus, in (36b), mic'i-mic'ia distributes phrasally over events: for each of several events, the apples were moved, as a whole. However, in (36c), mic'-mic'ia distributes clausally over the direct object NP vašlebi: for each apple, there was an act of moving; hence, each apple was moved separately—and only once. The interpretations of (36b) and (36c) may be represented as follows:
(38) a. Phrasal Distributivity—(36b)

b. Clausal Distributivity—(36c)

The following data provide further support for the distinction between mic'i-mic'ia and mic'-mic'ia. If the plural direct object vaslebi in (36c) is replaced by a singular form, (39c), with clausal distributive verb mic'-mic'ia becomes ungrammatical, since there is no plural NP for the reduplicated verb to distribute over:

(39) a. Man vasli mic'ia
3sg-erg apple-nom moved-3sg
"He moved the apple"

b. Man vasli mic'i-mic'ia
3sg-erg apple-nom moved-ph:dist-3sg
"He moved the apple in stages"

c. *Man vasli mic'-mic'ia
3sg-erg apple-nom moved-cl:dist-3sg
"He moved each of the apple separately"

Conversely, replacing the singular subject NP man in (36) with a plural NP imgenma makes sentence (40c) with clausal distributive verb mic'-mic'ies ambiguous: in (40c), mic'-mic'ies may distribute over the subject NP—as in (40c/i), or over the direct object NP—as in (40c/ii), or over both NPs—as in (40c/iii):

(40) a. Imgenma vaslebi mic'ies
3pl-erg apples-nom moved-3pl
"They moved the apples"
b. Imgenma *vaslebi* mic'i-mic'ies
   3pl-erg apples-nom moved-ph:dist-3pl
   "They moved the apples in stages"

c. Imgenma *vaslebi* mic'-mic'ies
   3pl-erg apples-nom moved-cl:dist-3pl
   (i) Each of them separately moved the apples
   (ii) They moved each of the apples separately
   (iii) Each of them separately moved each of the apples separately

Quite incredibly, we have not yet exhausted the semantic richness of the verb *mic'ia* and its reduplicated forms. The form *mic'ia* contains a prefix *mi-* denoting motion away from the speaker—other examples of verbs cited in this chapter containing this prefix include *miakovt* "carry-3pl" in (2c), and *mirboda* "ran-3sg" in (4) and elsewhere. However, Georgian possesses a number of other prefixes applying productively to verbs of motion—one of which is *mo-*, denoting motion towards rather than away from the speaker. As indicated in the following examples, these two prefixes, *mi-* and *mo-*, may occur one on each of the two components of the reduplicated verb forms—resulting in a distributive verb denoting motion of a to and fro nature;

(41) a. Man *vaslebi* mic'i-moc'ia
   3sg-erg apples-nom moved-to:and:fro-ph:dist-3sg
   "He moved the apples to and fro repeatedly"

   b. Man *vaslebi* mic'-moc'ia
   3sg-erg apples-nom moved-to:and:fro-cl:dist-3sg
   "He moved each of the apples to and fro separately"

The distinction between (41a) and (41b) may be represented diagrammatically as follows:
Morphologically, it seems as though the verbal stem o or o' is re-duplicated first, and then the directional prefixes mi- and mo- (as well as the inflectional suffix -a) are applied. Logically, however, the order would appear to be the opposite, with the scope of the directional prefixes mi- and mo- contained within that of the relation of distributivity. To see this, note that for each event in (41a), and for each apple in (41b), there exists a to and fro motion—the diagrams in (42) represent these facts clearly. If the directional prefixes mi- and mo- had wider scope than the relation of distributivity, then the sentences in (41) would allow the following interpretations:

(43)  

a. An Unacceptable Interpretation of (41a)

b. An Unacceptable Interpretation of (41b)
As in (42), the motion in (43) is distributed over events in the first case, and over apples in the second. However, unlike (42), in (43) the sum total of all the motions add up to a single to and fro motion. That (43a) and (43b) are impossible interpretations of (41a) and (41b) respectively indicates that the relation of distributivity induced by reduplication has wider scope than the semantics of to and fro motion resulting from the verbal prefixes mi- and mo-. Sentences (41a) and (41b) may accordingly be analyzed as in (44a) and (44b)—where, in accordance with the above discussion, the relation of distributivity applies to a verb denoting to and fro motion:

(44) a. **Phrasal Distributivity**—(41a).
   \[
   \text{HE } \text{[[S UNITS] APPLE]} \text{[[S UNITS] MOVED:TO:AND:PRO-DIST]}
   \]

b. **Clausal Distributivity**—(41b).
   \[
   \text{HE } \text{[[S UNITS] APPLE]} \text{[[S UNITS] MOVED:TO:AND:PRO-DIST]}
   \]

In spite of its complexity, the semantics of reduplicated verbal expressions such as mic'i-moc'ia and mic'-moc'ia is thus purely compositional, being constructed out of a verbal stem denoting motion, prefixes mi- and mo- providing to and fro directionality, and reduplication—of two different varieties—forcing phrasal or clausal distributivity.

Although of limited occurrence, reduplicated verbs in Georgian provide additional support for our unified analysis of reduplication as involving a relation of distributivity. In doing so, they also provide further support for the analysis of distributivity proposed in chapter 4, and, in particular, the claim that distributivity may obtain over a variety of phrasal and clausal domains, and between nouns and verbs. In the next chapter, we shall encounter a much more productive strategy for
forming distributive verbs, in Maricopa. In the meantime, we shall continue with our analysis of reduplication in Georgian, turning, finally, to the last major syntactic category—nouns.

7.2.4 Distributive Nouns

The class of distributive nouns in Georgian is more restricted than distributive adjectives, adverbs, or verbs, being limited essentially to a series or two of noun-like distributive numerals. As pointed out in section 7.1.2, nominal numerals may be formed by suffixation of the nominalizing suffix -euli to the numeral stem. However, the suffix -euli may also be added to reduplicated numeral stems to form distributive nominal numerals. Thus, corresponding to (6c,d) with non-reduplicated numeral stem are (45a,b) with reduplicated numeral stem:

both may be glossed, roughly, as "Some/the boys ran in threes":

(45) a. Bayšvebis sam-sameulebi mirboda
    boys-gen three-dist-nml-nom ran-3sg

  b. Bayšvebi sam-sameulat mirbodnen
    boys-nom three-dist-nml-adv ran-3pl

While distributive numeral sam-sameuli in (45a) is a noun, distributive numeral sam-sameulat in (45b) is an adverb. The above sentences may be analyzed as follows:

(46) a. $[[3\text{-DIST} \rightarrow \text{UNITS}] \text{BOY}] \text{RAN}$ (for (45a))

  b. $[[S \text{UNITS}] \text{BOY}][3\text{-DIST} \rightarrow \text{UNITS}] \text{RAN}$ (for (45b))

In fact, we may perhaps wish to take the nominalizing suffix -euli as a morphosyntactic realization of the logical classifier constituent UNITS in (46). Note, however, that -euli is suffixed following reduplication.
(otherwise the result would be sameul-sameuli): -eul thus has the function of nominalizing an already distributive adjectival expression—the adnominal distributive numeral stem sam-sam. I am aware of no instance where a nominal (rather than adjectival) stem is reduplicated to form a distributive nominal expression. Distributive nouns such as sam-sameuli thus occupy a marginal position in the grammar of Georgian nominal phrases—in sharp contrast to distributive adjectives and adverbs, the formation of which—as we had occasion to see in previous sections—is quite productive. 15

7.2.5 Summary

In the course of section 7.2, we saw that the morphological process of reduplication may apply to large classes of adjectives and adverbs, as well as to a smaller class of verbs; in addition, we found that a small class of reduplicated nouns could be formed from reduplicated adjectives. In particular, we observed that within each syntactic category, numerals were the most likely subclass to undergo reduplication. Thus, for example, adnominal numerals of arbitrary length could be reduplicated—in violation of the constraint on number of syllables valid for many other adjectives; similarly, numerals constituted the only subclass of reduplicated nouns.

Semantically, we found that the effect of reduplication is, almost always, to force the reduplicated expression to distribute over another constituent—most often phrase internally, but, sometimes, also clausally. 16 We thus provided a unified semantic analysis of reduplicated expressions belonging to four different syntactic categories—adjective, adverb, verb, and noun—in terms of a single semantic
relation, distributivity, obtaining over a variety of syntactic domains. In doing so, we provided strong support for the analysis of distributivity developed in chapter 4, whereby distributivity may obtain clausally, between NPs and/or verbal phrases, and phrasally, between modifiers and their heads.

In addition, we found that we could account for the semantics of distributive numerals as particular instances of reduplicated expressions belonging to the larger syntactic categories of adjective and adverb. Thus, for example, our analysis of adnominal distributive numerals completely parallels that of distributive adjectives—of which adnominal distributive numerals constitute a subclass. The unified analysis of reduplication in Georgian thus provides strong additional support to the universally oriented analysis of distributive numerals proposed in chapter 5.

Last but not least, our semantic analysis of reduplication provides valuable insights into particular grammatical patterns of Georgian. Thus, for example, it underscores the syntactic and semantic unity between adjectives and adnominal numerals—contra Tagalog, in which, as we saw in the previous chapter, numerals are more closely associated with nouns. In chapter 9, we shall review some of these patterns of cross-linguistic variation, in an attempt to formulate universal generalizations governing these patterns.

7.3 Stacked Numerals

After our general analysis of the semantics of reduplication in Georgian, we shall now consider in detail a particular construction type involving adnominal distributive numerals—namely, stacked
numerals. This is a construction type typical of languages possessing adnominal distributive numerals.

As argued in previous sections of this chapter, adnominal numerals are a subclass of adjectives, and hence, adnominal distributive numerals are a subclass of distributive adjectives. One of the hallmarks of adjectiveal expressions is that they may be stacked—as in, say, English (47):

(47) Tall Albanian students

Numerals, however, may not be stacked in English:

(48) *Ten two students

The unacceptability of constructions such as (48) is commonly invoked in order to argue for an analysis assigning numerals to a syntactic category of determiner, combining with common noun phrases to yield determined noun phrases. However, even for English, a reasonable case could be made that the unacceptability of (48) is semantically, rather than syntactically motivated—paralleling, perhaps, that of (49): 17

(49) *Navajo Albanian students

Turning, now, to Georgian, the adjectiveal nature of numerals provides prima facie reason to expect to find stacked numeral constructions, similar to, say, English (47)-(49). Translating (48), however, the result is just as bad as in English:

(50) *Ati ori st'udent'i
ten-nom two-nom student-nom
"Ten two students"

But if one or both of the numerals in (50) are distributive, the resulting constructions are acceptable:
(51) Ati or-ori st'udent'i
ten-nom two-dist-nom student-nom

(52) At-ati or-ori st'udent'i
ten-dist-nom two-dist-nom student-nom

What do these constructions mean? Example (51) may be interpreted in any of the following three ways:

(53) a. Ten sets of two students
    b. Ten students in sets of two
    c. Ten sets of several sets of two students

Using "x's" to denote students, the above three classes of interpretations may be represented diagrammatically as follows:

(54) a. 
    x  x  x  x  x  x  x  x  x  x  x
    x  x  x  x  x  x  x  x  x  x

    b. 
    x  x  x  x  x  x
    x  .x'  x  x  x
Example (52) may be interpreted in any of the following two ways:
(54) a. Several sets of ten students and several sets of two students

b. Several sets of ten sets of several sets of two students

When representing these diagrammatically, we may, for (54a), distinguish between two particular subclasses of interpretations: that represented in (55a/i), where the students in tens and the students in twos are disjoint, and that represented in (55a/ii), where the students in tens are identical to the students in twos. (Of course, any number of intermediate cases where some but not all of the students are both in tens and in twos also belong to class (54a) of interpretations of (52).)

Class (54b) is represented in (55b).

(55) a. (i)

```
  x x x   x x x   x x x
  x x x   x x x   x x x
  x x x   x x x   x x x
```

```
  x   x   x
  x   x   x
```

(ii)

```
  x   x   x   x   x
  x   x   x   x   x
```

```
  x   x   x   x   x
  x   x   x   x   x
```

```
  x   x   x   x   x
  x   x   x   x   x
```

```
  ...
  ...
  ...
```

233
For the reader whose mind has been boggled by the preceding few pages, it may perhaps be comforting to observe that the semantics of stacked numeral constructions in Georgian is quite straightforward, paralleling very closely that of stacked adjective or determiner plus adjective constructions in English. Our analysis is based jointly on a structural ambiguity between parsings of the form [A A] N and A [AN], and on two possible scope relations that may obtain, in the former case, between [A A] and N constituents. In this latter respect, it is essentially similar to the analysis of phrases containing conjoined adjectival or numeral phrases proposed in sections 4.2.3 and 4.2.4. We shall begin by providing parallel analyses of Georgian stacked numeral construction (51) ati or-ori st'udent'i—in (57), and English determiner plus numeral construction many Albanian students—in (56).

(56) Many Albanian students

a. \[
\text{[[MANY AND ALBANIAN] } \sim \text{ UNITS] STUDENT}
\]

Both collectively many and individually Albanian units of student
"Albanian students, who are many relative to students in general"

b. \[
\text{[[MANY AND ALBANIAN] } \triangleright \text{ UNITS] STUDENT}
\]

Collectively many units and individually Albanian units of student
"Many students and Albanian students (not necessarily the same ones)"

c. \[
\text{[MANY UNITS] [[ALBANIAN } \rightarrow \text{ UNITS] STUDENT}
\]

Collectively many units of individually Albanian units of students
"Albanian students, who are many relative to Albanian students"
(57) Ati or-ori st'udent'i

a. \[ [[10 \text{ AND } 2-\text{DIST}] \sim \text{UNITS}] \text{STUDENT} \] (for (53a))
Units numbering ten together and two each of student
"Several sets of two students, numbering ten together, relative to sets of two students"

b. \[ [[10 \text{ AND } 2-\text{DIST}] \succ \text{UNITS}] \text{STUDENT} \] (for (53b))
Units numbering ten together and units numbering two each of student
"Ten students, and several sets of two students"

c. \[ [10 \text{UNITS}] [[2-\text{DIST} \rightarrow \text{UNITS}] \text{STUDENT}] \] (for (53c))
Units numbering ten together of units numbering two each of student
"Several sets of two students, numbering ten together, relative to several sets of two students"

The parallel between (56) and (57) is facilitated by the fact that both English many and Georgian ati force collective interpretations on their heads, whereas both English Albanian and Georgian or-ori distribute over their heads. Let us now explore this parallel in detail.

Of the three suggested analyses of (56), two, namely, (56a) and (56c), are readily acceptable by speakers of English; however, the remaining one, (56b), appears totally unacceptable. Interestingly, though, the analogous class of interpretations becomes acceptable (though perhaps not preferred) for conjoined adjectives--particularly it the adjectives are semantically similar; thus, red and blue flowers may be interpreted as meaning "red flowers and blue flowers". Turning, now, to the stacked numeral construction (57) in Georgian, we find that all three analyses are obtained--and that they correspond, in fact, to the three classes of interpretations of (51) represented in (53) and (54). Thus, in (57a), the students number ten relative to student
units in general (which happen to each number two)—just as, in (56a), the students are many relative to student units in general (which happen to each be Albanian). Conversely, in (57c), the students number ten relative to "two-dist students" (i.e. several sets of two students)—just as, in (56c), the students are many relative to Albanian students. Hence, in (57a), there are ten sets of two students, whereas in (57c), there are ten sets of several sets of two students.

Analysis (57b) is a little more problematical; although it allows for class (53b) of interpretations (ten students in sets of two), it is too permissive, in that it allows also for additional unwanted interpretations, where the units numbering ten together do not consist of the same students that are contained in the units numbering two each. That is to say, it allows for states of affairs where there are lots of students, some of which form a set of ten, while others form several sets of two. I can see no principled way of tightening the analysis in (57) in order to rule out such interpretations. However, it may not be desirable to do so. Thus, in footnote 12 chapter 4, it was argued that an analysis corresponding to (57b) is necessary in order to account for certain constructions in English and other languages involving complex numerical expressions. It is also interesting to note that the overly permissive nature of (57b) is mirrored by the unacceptability of (56b)—thereby further supporting the parallel between (56) and (57).

The analysis of (57a,b) as involving conjoined numerals (rather than a nested structure, as in (57c)), is supported by the rather surprising fact that (51) ati or-ori st'udent'i may be paraphrased as in (58) below, where the order of the two numerical expressions is reversed:
(58) Or-ori ati st'udent'i
two-dist-nom ten-nom student-nom

(Apparently, though, (51) is preferred over (58).) In particular, it
is surprising that (58) may mean "ten sets of several sets of two
students", as per (57c)--but not "several sets of two sets of ten stu-
dents", as would result from the following hypothetical analysis:

(59) [2-DIST → UNITS] [[10 UNITS STUDENT]]

Apparently, Georgian has a constraint against constructions of the form
Num [Num N], where the embedded numeral is not distributive; hence (59)
is unacceptable, and (58) is interpreted as synonymous with (51). How-
ever, I have no explanation for this constraint.19

We may now go on to provide an analysis of (52) at-ati or-ori
st'udent'i with two distributive numerals--in (61), contrasting it
with that of the English stacked adjective construction tall Albanian
students--in (60).

(60) Tall Albanian students
  a. [[TALL AND ALBANIAN] # UNITS] STUDENT
     Both individually tall and individually Albanian units
     of student
     "Albanian students who are tall relative to students in
general"

  b. [[TALL AND ALBANIAN] # UNITS] STUDENT
     Individually tall units and individually Albanian units
     of student
     "Tall students and Albanian students (not necessarily the
     same ones)"

  c. [TALL → UNITS] [[ALBANIAN → UNITS] STUDENT]
     Individually tall units of individually Albanian units
     of students
     "Albanian students who are tall relative to Albanian students"
(61) At-ati or-ori st'udent'i

\[\begin{align*}
a. \quad & \hbox{[[10-DIST AND 2-DIST] } \preceq \text{UNITS}] \hbox{STUDENT} \\
& \text{Units numbering ten each and two each of student} \\
& \text{"Several sets of two students numbering ten each relative to sets of two students"}
\\
b. \quad & \hbox{[[10-DIST AND 2-DIST] } \succeq \text{UNITS}] \hbox{STUDENT} \quad \text{(for \((54a)\))} \\
& \text{Units numbering ten each and units numbering two each of student} \\
& \text{"Several sets of ten students and several sets of two students"}
\\
c. \quad & \hbox{[10-DIST } \rightarrow \text{UNITS}] \hbox{[[2-DIST } \rightarrow \text{UNITS}] \hbox{STUDENT} \quad \text{(for \((54b)\))} \\
& \text{Units numbering ten each of units numbering two each of student} \\
& \text{"Several sets of two students numbering ten each relative to several sets of ten students"}
\end{align*}\]

This time, the parallel between (60) and (61) hinges on the fact that like Georgian distributive numerals at-ati and or-ori, both English adjectives tall and Albanian are interpreted as distributing over their heads. Turning, first, to English (60), we may note that—as was the case for (56)—the first and third analyses, in the present case (60a) and (60c), are obtained by speakers of English, whereas the second analysis, (60b), is not. Note, however, that for a different choice of adjectives, e.g. Navajo and Albanian as in (49), (60a) would be semantically ill formed. Such is in fact the case in Georgian (61a), where the two distributive numerals at-ati and or-ori are contradictory—like (49), and also like (48) and (50) with two stacked cardinal numerals. That is, (61a) is anomalous because it stipulates the existence of several units, or sets, each one of which is both of cardinality ten and of cardinality two. This, then, is the reason that (52)—as opposed to (51)—has (mercifully) only two classes of interpretations, and not three. 

20
Analysis (61b) accounts for class (54a) of interpretations of (52), in which there are several sets of ten students and several sets of two students. Unlike its counterpart (57b), analysis (61b) is not overly permissive; as indicated in (55a), (52) allows for the students to belong to the sets of ten or to the sets of two, as in (55a/i), and not necessarily to both, as in (55a/ii)—contra (57b), where the students must belong both to the (single) set of ten, and to the sets of two. Finally, analysis (61c) accounts for class (54b) of interpretations, in which there are several sets of ten sets of several sets of two students—as indicated most clearly in diagram (55b). In (61c), the students number "ten-dist" (i.e. several sets of ten) relative to "two-dist students" (i.e. several sets of two students)—just as in (60c), the students are tall relative to Albanian students. 21

In the preceding pages, we have thus seen that the syntax and semantics of stacked adnominal numerals (distributive or otherwise in Georgian parallels that of stacked adjectival constructions in English. In fact, there would appear to be no hard and fast upper bound on the number of numerals that may occur in a stacked numeral construction in Georgian—the only limitation being the ability of the speaker to keep track of the sets of sets of sets. 22 Stacked adnominal numerals thus provide further support for the claim that adnominal numerals constitute a subclass of adjectives in Georgian. And the analyiss of stacked numeral constructions proposed in this section offers a fine application of the analysis of distributivity and distributive numerals developed in chapters 4 and 5.

240
Stacked adnominal numeral constructions are not peculiar to Georgian; in fact, they are quite typical of languages possessing adnominal distributive numerals. In the passage by Virgil quoted in the preface, there appears a stacked numeral construction *pueri bis seni* "boys-nom twice six-list"—as noted by Ernout and Thomas (1959: 176), constructions such as these are widespread in Latin poetry. In the next chapter, we shall encounter stacked adnominal numeral constructions in Maricopa, differing semantically in interesting ways from those in Georgian.23

7.4 Other Distributive Expressions in Georgian

This concludes our analysis of distributive expressions involving reduplication in Georgian. In view of the great productivity of such expressions, one might well wonder what need Georgian has for yet other morphosyntactic strategies for expressing the semantic relation of distributivity. Recall, however, that the preferred or only classes of interpretations of constructions containing reduplicated expressions involved distributivity within phrases. It is, therefore, not surprising to find that Georgian has other devices for the purpose of inducing clausal distributivity. Two of these devices, the universal quantifiers *tito* and *q'oveli*, are considered below.24

7.4.1 *tito*

Following are some typical constructions involving *tito*:25

(62) a. Titom ori k'acidan sami yanta c'aiyo
    each-erg two-nom man-nom-from three-nom suitcase-nom carried-3sg

241
b. Ori k'acidan titom sami ɣanta c'aiyo
two-nom man-nom-from each-erg three-nom suitcase-nom carried-3sg

c. Ori k'acidan sami ɣanta c'aiyo titom
two-nom man-nom-from three-erg suitcase-nom carried-3sg each-erg

(63) a. *Titom orma k'acma sami ɣanta c'aiyo
   each-erg two-erg man-erg three-nom suitcase-nom carried-3sg

b. Orma k'acma titom sami ɣanta c'aiyo
   two-erg man-erg each-erg three-nom suitcase-nom carried-3sg

c. Orma k'acma sami ɣanta c'aiyo titom
two-erg man-erg three-nom suitcase-nom carried-3sg each-erg
   (= (2f) chapter 2)

The sentences in (62) correspond closely to English Each of two men
carried three suitcases, with titom bearing the case of the subject NP,
and ori k'acidan forming a partitive construction. The sentences in
(63) correspond closely to English Two men each carried three suitcases
or Two men carried three suitcases each, with both titom and orma k'acma
bearing the case of the subject NP. Both (62) and (63) have class A of
interpretations, as defined in (4a) chapter 2.27 Syntactically, tito
thus behaves very similarly to English each--though sentences (62b,c)
exemplify word orders not available in English.

Perhaps the most interesting fact about tito is that--like each
(section 4.3.1) and adnominal distributive numerals (section 5.1.2),
its occurrence is governed by the grammatical relations hierarchy, there-
by providing excellent evidence for the viability of the notion of sub-
ject in Georgian. Consider the following sentences:
(64) a. Orma k'acma sami čanta c'aiyo titom
two-erg man-erg three-nom suitcase-nom carried-3sg each-erg
     (= (2f) chapter 2 = (63c))

b. *Orma k'acma sami čanta c'aiyo tito
two-erg man-erg three-nom suitcase-nom carried-3sg each-nom

(65) a. Ori k'aci sam čantas iyebs tito
two-nom man-nom three suitcase-dat lift-3sg each-nom

b. *Ori k'aci sam čantas iyebs titos
two-nom man-nom three suitcase-dat lift-3sg each-dat

(66) a. Or k'acs sami čanta miakvs titos
two man-dat three-nom suitcase-nom darry-3sg each-dat

b. *Or k'acs sami čanta miakvs tito
two man-dat three-nom suitcase-nom carry-3sg each-nom

(67) a. Sami ċanta ori k'acit c'ayebulia tito
three-nom suitcase-nom two-nom man-instr carry-part-sg each-nom

b. *Sami ċanta ori k'acit c'ayebulia
three-nom suitcase-nom two-nom man-instr carry-part-sg
    titotit
    each-instr

Sentences (64)-(67) correspond to sentences (2) and (3) section 7.1.1, with respect to the variety of different case markings encoding identical thematic relations. However, in spite of this morphological diversity, the syntax and semantics of tito is governed by the grammatical relation of subject. First, note that the case marking of sentence final tito must be identical to that of the subject NP--ergative orma k'acma in (64a), nominative ori k'aci in (65a), dative or k'acs in (66a), and nominative sami čanta in (66a); sentences in which the case marking of tito is identical to a non-subject NP are ungrammatical. Semantically, tito always forces a non-subject NP to distribute over a subject NP--
hence, sentences (64)-(66) involve two men and between three and six suitcases, while sentence (67) involves three suitcases and between two and six men. Note that the subject NP can be coded in ergative, nominative, or dative cases; it can be either agent or patient, and either animate or inanimate. Yet, as indicated in (64)-(67), the syntax and semantics of tito is sensitive to none of these factors, but, rather, to the grammatical relation of subject. In this respect, it resembles English each, and adnominal distributive numerals in most languages, but not—as shown in section 6.3.1—Tagalog. It thus provides support for the superficiality of case marking systems in Georgian, and the viability of at least one important grammatical relation—that of subject.

7.4.2 q'oveli

A different picture, however, is presented by the second universal quantifier, q'oveli. In general, q'oveli is more likely than tito to occur adnominally, and less likely to occur as an adverbial marker of distributivity; thus, for example, (68)—corresponding to (2f) chapter 2 = (63c), (64a) with tito—is of doubtful grammaticality:

(68) Orma k'acma sami \(\text{\textquotesingle} \text{\textacute{c}}\text{\textacute{n}ta} \) c'aiyo q'ovelma
two-erg man-erg three-nom suitcase-nom carried-3sg every-erg

However, q'oveli may occur more readily in sentence final position if the sentence is intransitive, though—as indicated by the following sentences—this would appear to be contingent on its being in the ergative case:

(69) a. Q'ovelma bāyvma imyera
every-erg boy-erg sang-3sg
b. Bavsvma imyera q'ovelma
    boy-erg sang-3sg every-erg
    "Every boy sang"

(70) a. Q'oveli bavsva m'yersis
    every-nom boy-nom sing-3sg
b. *Bavsvi m'yersis q'oveli
    boy-nom sing-3sg every-nom
    "Every boy is singing"

Thus, while the behaviour of tito was argued above to be governed by
grammatical relations, that of q'oveli appears to be governed, at least
in part, by surface case marking. More work is obviously required be-
fore firmer conclusions can be reached.
Footnotes - Chapter 7

1 The Georgian data cited in this chapter were elicited from Tamara Japaridze during January-March 1981 in Los Angeles, and from Manana Bat-Hana during November 1981 - June 1982 in Tel Aviv. In addition to the usual idiolectal differences in judgements of sentences involving distributive numerals, the two speakers represented somewhat different regional dialects, the former speaker being from Tbilisi, the latter a native of Kutaisi. In those cases where the speech of both speakers differed, the data cited in this chapter reflect the dialect of the latter speaker.

2 According to Georgian grammar books, the plural suffix -eb is obligatory in the case of semantically plural bare nouns—for example in (2), but not permitted when the noun occurs in construction with a numeral or other plural quantifying expression—as in (4c). This was also the case in the speech of the first speaker I consulted. However, the second speaker fluctuated considerably in her use of the plural marker in constructions containing numerals—at first employing it more frequently, but later (after having listened to other speakers and become more self conscious) tending to avoid its use. Interestingly, in constructions involving adnominal distributive numerals, both speakers varied freely between singular and plural forms of the noun, with perhaps a preference for the plural form. All the data in this chapter are presented as they were volunteered to me, with no attempt made at standardizing the use of the plural suffix -eb. In no instance was I able to discover any semantic differences between numeral plus noun constructions with and without the plural morpheme.

3 The paradigm presented in (5) is somewhat simplified. In particular, it applies only to consonant final stems—e.g. sam, lamaz, and bavsv; vowel final stems—e.g. čanta "suitcase", tito "each" may differ in some details.

The paradigm differs from that provided in grammar books in one detail—the adverbial suffix -at. Grammar books—and the first speaker I consulted—have -ad; however, the second speaker, whom I follow here, has -at. Note that Georgian has an optional phonological rule of word final consonant devoicing—e.g. -ad → -at. It may be speculated that this rule caused the suffix -ad to be reanalyzed as -at in the dialect of the second speaker. (That the second speaker actually has an underlying -at rather than obligatory devoicing is supported by her use of the grapheme for t—rather than that for d—for the adverbial case suffix.)

4 Numerals may also occur as nouns, pronominally, as in:

(i) Sami mirboda
three-nom ran-3sg
"Three came"

246
When occurring pronominally, they are declined as nouns, rather than as adjectives. We shall not be concerned with this type of construction any further.

5 The suffix -eul may form nouns from adjectives or from other nouns, e.g. tetri "white", tretreul "milk product"; t'k'bili "sweet"; t'k'bileul "cookie"; švili "son"; švileul "descendant"; tenvi "fish"; tevzeul "fish product". Many adjectives, however, cannot take -eul, e.g. didi "big" *dideuli; axali "new", *axaleuli. With quantifying expressions, -eul may always occur, to form a noun denoting a set consisting of so many members, e.g. bevri "many", bevreul "a set of many"; cota "few", coteuli "a set of few", as-oc-da-samli "one hundred and twenty three", as-oc-da-sameuli "a set of one hundred and twenty three".

6 Constraints on reduplication based on number of syllables are quite common cross-linguistically; Moravcsik (1978:306) cites similar examples from Mandarin Chinese, Rotuman, and Washo.

7 For example, of two three-syllable adjectives both meaning "sad", one moc'q'enil, may be reduplicated, yielding moc'q'enil moc'q'enili, while the other, sevdian, may not be reduplicated to yield *sevdian-sevdiani. Here, neither number of syllables nor semantic class offer any clues.

8 These facts lead us to predict that distributive adjectives may not enter into constructions with singular nouns. This prediction is only partially borne out. In some cases, a partitive interpretation results. Consider, for example, a painting composed, in pointillist style, of blue and yellow dots: when viewed from close up the dots become visible, but when viewed from afar the painting appears uniformly green. Such a painting may be described either as in (i/a) or as in (i/b)—but not as in (i/c) or (i/d):

(i) a. Mc'vani surati
green-nom painting-nom
b. Lurj-lurji da q'vitel-q'viteli surati
blue-dist-nom and yellow-dist-nom painting-nom
c. Mc'van-mc'vani surati
green-dist-nom painting-nom
d. Lurji da q'viteli surati
blue-nom and yellow-nom painting-nom

Rather than distributing over natural countable units, i.e. individual paintings, the adjectival phrase lurj-lurjí da q'vitel-q'viteli distributes over partitive units, or picture-parts, as determined by a particular style of painting. The interaction revealed by (i) between distributivity and mereology would appear to merit further attention.

In other cases, however, the semantics of distributive adjectives in construction with singular nouns is more idiosyncratic. For example, while lamaz-lamazi q'avavili in (17b) means "individually pretty flowers",

247
lamaz-lamazi q'vavili means not "individually pretty flower-parts" (as might be expected in view of (i)), but, rather, "almost pretty flower". I have no explanation for such facts—other than to note, reassuringly, that such idiosyncracies appear to be restricted to distributive adjectives modifying singular nouns, which we would have predicted in any case to be ungrammatical.

The parallel between čkari and sami is, as noted, incomplete, in that čkari—but not sami—may distribute over its head in the absence of reduplication. Of interest to us, however, are the reduplicated forms čkar-čkari and sam-sami, and here the parallel is complete.

This use of reduplication to induce distributivity over events is reminiscent of the cross-linguistically widespread use of reduplication to form repetitive or progressive verbal aspects; E. Moravcsik (1978:319–321) cites examples of this latter use of reduplication from Dyirbal, Samoan, Somali, Twi, Tzeltal, and several other languages.

While it would seem that there indeed exists an interesting relationship between these two semantic roles of verbal reduplication, this relationship is not one of identity. Verbal reduplication in Georgian stands clearly apart from the intricate verbal aspectual system, based on affixation. Instead, it is both morphosyntactically and semantically akin to the more productive phenomenon of reduplication within the categories of adjective and adverb—sharing with these other instances of reduplication the semantic feature of distributivity. It may be speculated that distributive reduplicated verbal constructions elsewhere might provide diachronic sources for reduplicative aspectual markings such as those cited by Moravcsik. Synchronously, however, forms such as gamayld-gamaylda are closer in spirit to instances of syntactic reduplication, as, for example, in the English grew and grew, or talked and talked.

In view of the mind boggling nature of the data that follow, I feel that it is incumbent on me to point out that although they were elicited from the speech of a single speaker, I had the opportunity to reexamine them some six months later with the same speaker; I am happy to report that each and every judgement was replicated with perfect accuracy.

Unfortunately, I have no information on the internal structure of the verb mic'ia that could contribute to an understanding of the nature of the difference between reduplicated forms mic'i-mic'ia and mic'-mic'ia—in particular, what the function of the second vowel i is. Georgian verbal morphology is a notoriously difficult subject—and I have not been able to illuminate it to any significant degree.

Of course, our analysis leaves unresolved the problem of how to get the morphology to work out right. In view of (44), a more logically felicitous verbal morphology would permit forms such as
*mimoc'i-mimoc'ia or *mimoc'-mimoc'ia; these, however, are ungrammatical. The existent forms mic'i-moc'ia and mic'-moc'ia must accordingly be treated as instances of imperfect reduplication.

14 Sentences (14a) and (14b) may also be paraphrased as in (i/a) and (i/b), where, instead of reduplication of the numeral stem sam, the plural morpheme -eh occurs after the nominalizing suffix -sul:

(i) a. Bāvvebi sameulebi mirbodnen boys-gen three-nml-pl-nom ran-3pl
b. Bāvvebi sameulabat mirbodnen boys-nom three-nml-pl-adv ran-3pl

The numeral sameulebi is thus synonymous with the distributive numeral sam-sameuli; similarly, sameulabat is synonymous with sam-sameulat. It does not follow automatically, however, that sameulebi and sameulat are--like their reduplicated counterpart--distributive. In the next chapter, we shall see that Maricopa has parallel and synonymous series of distributive and plural numerals--and we shall address the question of whether the plural numerals should be analyzed as distributive--by dint of their synonymity with their bona fide distributive counterparts.

15 Thus, for example, while adjectives may undergo reduplication or suffixation of -sul, quite productively, no adjectives other than numerals may undergo both processes, to yield (a non-numerical) noun. For example, adjective brd' eni "clever" may undergo reduplication to form distributive brd' en-brd' eni, and it may take suffix -sul to form the noun brd' en-eneuli "clever sayings"--but there is no form *brd' en-eneuli. In other cases, the requisite form exists--e.g. dž-val-dž-veleuli from dž-vel "old", but may be used only adjectively--e.g. dž-val-dž-veleuli k'abebi--"individually old skirts", and not as a distributive noun.

16 It is of interest to examine our semantic characterization of reduplication in Georgian in light of E. Moravcsik's (1978) seminal cross-linguistic study of reduplicative constructions. On p. 316 Moravcsik writes:

"reduplicative constructions almost always entail everything that their unreduplicated counterparts do and, in addition, also some thing(s) that their unreduplicated counterparts do not. Specifically, I have found no clear example of an unreduplicated construction's meaning properly including the meaning of the corresponding reduplicated one..."

Consider, now, example (14), reproduced below:

(i) a. Čkari at'let'ebi fast-nom athletes-nom
b. Čkar-čkari at'let'ebi fast-dist-nom athletes-nom
Given that čkari in (i/a) may also distribute over its head (though, unlike čkar-čkari in (i/b), it is not obliged to), the meaning of unreduplicated (i/a) clearly properly the meaning of reduplicated (i/b)—contra Moravcsik's generalization. In fact, the state of affairs exemplified by (i) is the rule, not the exception, for reduplicated expressions in Georgian.

Consider, for example, numeral constructions, e.g. (19), reproduced below:

(ii) a. Sami at'let'i
    three-nom athlete-nom

b. Sam-sami at'let'i
    three-dist-nom athlete-nom

If ordinary numerals are interpreted as increasing, then the meaning of non-reduplicated (ii/b), "three athletes", properly contains that of (ii/b), "several sets of three athletes".

I am aware, however, of a single example of reduplication in Georgian satisfying Moravcsik's generalization—involving decreasing quantifier expressions:

(iii) a. Cot'a at'let'i
    few-nom athlete-nom

b. Cot'-cot'a at'let'i
    few-dist-nom athlete-nom

Contrary to (i) and (ii) above, here the meaning of the reduplicated expression (iii/b) "several sets of few athletes" properly contains the meaning of the non-reduplicated construction (iii/a) "few athletes".

17 We shall not pursue this line of argument any further here. Note, however, the acceptability of other "stacked determiner" constructions in English:

(i) Every two students in this room have a friend in common

I keep trying to convince myself that someone wishing to deny (i) could respond by saying "No ..."

(ii) Only ten two students in this room have a friend in common.

But (ii) just fails to be grammatical in English, although it is quite intelligible.

18 Note that the availability of this class of interpretations is dependent on the divisibility of ten by two; for other choices of numerals, this class may be blocked.

19 This constraint is also needed to prevent (50) ati ori st'udent'i from being grammatical, under the interpretation "ten sets of two students"—as would follow from the following hypothetical analysis:
(i) [10 UNITS [[[2 UNITS] STUDENT]]
Units numbering ten together of units numbering two together of student
"Ten sets of two students"

20 Of course, if the two distributive numerals in (52) are replaced by adjectives, then the analysis corresponding to (61a) may be rendered acceptable. Thus, for example, the phrase indicated in (i) is interpreted as in (ii)—its analysis being as represented in (iii), completely paralleling (61a):

(i) Miṣidaru-miṣidari brən-brən st'udent'ebi
rich-dist-nom clever-dist-nom students-nom

(ii) Both individually rich and individually clever students

(iii) [[[RICH-DIST AND CLEVER-DIST] ⬤ UNITS] STUDENT]

21 Note that an analysis corresponding to (61c) is also called for if one of the distributive numerals is replaced by a distributive adjective. Thus, for example, the phrase indicated in (i) is interpreted as in (ii)—its analysis being as represented in (iii), again completely paralleling (61a):

(i) Atatiri brən-brən st'udent'i
ten-dist-nom clever-dist-nom student-nom

(ii) Several sets of ten individually clever students

(iii) [[10-DIST → UNITS] [[CLEVER-DIST → UNITS] STUDENT]]

22 In one case, I succeeded in eliciting a "triple-decker" construction, involving two numerals and a non-numerical quantifying expression. Presented with a drawing of four sets of three sets of many students, the speaker volunteered:

(i) Otxi sam-sami bevri bevri st'udent'ebi
four-nom three-dist-nom many-dist-nom students-nom

This may be analyzed as follows:

(ii) [[[4 AND 3-DIST] UNITS] [[[MANY-DIST → UNITS] STUDENT]]
Units numbering four together and three each of units numbering many each of student
"Four sets of three sets of several sets of many students"

I have no explanation why the distributive form bevri-bevri was volunteered in (i); (iii) with just bevri would seem more appropriate for the drawing offered:

(iii) Otxi sam-sami bevri st'udent'ebi
four-nom three-dist-nom many-nom students-nom

Note, however, that semantically, bevri-bevri is less different from bevri than, say, sam-sami is from sami; perhaps bevri-bevri was volunteered in (i) in order not to violate the constraint discussed previously against stacked quantifying expressions, where the second (innermost) quantifying expression is nondistributive.
23 As foreshadowed in section 5.2, stacked numeral constructions are semantically akin to constructions in which two numerals—one or both of which are adverbal—qualify the same noun. Thus, for example, English \textit{ten students in twos} appears to have class (53b)—but not (53a) or (53c)—of interpretations of Georgian (51) \textit{ati or-ori st'udent'i}. Similarly, English \textit{students in tens and twos} has class (54a)—but not (54b) of interpretations of Georgian (52) \textit{at-atI or-ori st'udent'i}. I have no explanation why the semantics of the English constructions is more restricted than that of their Georgian counterparts.

24 As universal quantifiers, I do not fully understand the nature of the differences—if any—between \textit{tito} and \textit{g'oveli}. Impressionistically, however, \textit{tito} seems to emphasize more the notion of separateness, while \textit{g'oveli} lays greater weight on the concept of totality. In that respect, \textit{tito} and \textit{g'oveli} would seem to closely parallel English \textit{each} and \textit{every} respectively—cf. Vender (1967). (They are, accordingly, glossed as "each" and "every" in the examples that follow.) Both \textit{tito} and \textit{g'oveli} force the noun which they qualify to be distributed over—like English \textit{each} and \textit{every}; in that respect, they differ from Georgian \textit{g'vela}, which—like English \textit{all}—does not force a relation of distributivity.

25 Both speakers consulted accepted alternative versions of (62) and (63) with a reduplicated form of \textit{tito}—one speaker offering \textit{tito-tito}, the other \textit{tit-tito}. Neither speaker provided any evidence for syntactic or semantic differences between unreduplicated and reduplicated forms. This is the only case I am aware of where reduplication has no apparent semantic effect in Georgian. The reason, presumably, is that \textit{tito}, itself, is already semantically distributive.

In addition to the abovementioned forms, I have also elicited constructions with an adnominal quantifier \textit{titeuli} "each-nml-nom" and an adverbal quantifier \textit{titulobit} "each-nml-nml-instr". These seem to differ from \textit{tito} in ways that I do not understand.

26 However, the following sentence, differing from (63a) only in the case marking of \textit{tito}, is grammatical:

(i) Tito orma k'acma sami canta c'aiyo
two-nom two-erg man-erg three-nom suitcase-nom carried-3sg

Sentence (i), however, is semantically quite different from (62) and (63), meaning, instead, "Every two men carried three suitcases". Interestingly, this is very close to class C of interpretations of the following sentence, where \textit{tito orma} in (i) is replaced by \textit{or-orma}:

(ii) Or-orma k'acma sami canta c'aiyo
two-dist-erg man-erg three-nom suitcase-nom carried-3sg

(= (21b) chapter 5)

The relationship between (i) and (ii) corresponds to that between the English phrases \textit{every two men} and \textit{sets of two men}.

252
Like English each, but unlike distributive numerals and Tagalog bawat—cf. chapter 6, Georgian tito does not appear to force disjointness or collectivity.
Chapter 8

8. Distributive Numerals in Maricopa

The third and final language whose distributive numeral constructions we shall consider in detail is Maricopa. Of the three languages considered in detail in this dissertation, Maricopa is by far the least extensively studied—the only works dealing exclusively with Maricopa that I am aware of being Harwell (1976), Gordon (1979, 1981), and Thomas-Flinders (1981). Markers of distributivity are but briefly discussed in passing, in Gordon (1981). In this chapter, we shall examine two markers of distributivity in Maricopa: the verbal suffix -xper, and a morphological process of ablaut forming plural numerals. In many constructions, these markers present few problems of analysis. However, Maricopa differs typologically in many respects from most better known languages; moreover, several construction types—e.g. switch reference clauses, conjunctions—are not well understood, and may be subject to alternative analyses. Much of this chapter will accordingly be concerned with the interaction of markers of distributivity with various construction types characteristic of Maricopa. As a result, a number of problems raised in this chapter will remain unsolved—in want of a more thorough understanding of various grammatical structures in Maricopa. Nevertheless, the analysis of distributivity in Maricopa presented in this chapter will contribute jointly towards both the study of the syntactic patterns of Maricopa, and the study of distributivity in universal grammar.
8.1 Some Features of Maricopa Grammar

Even for those linguists familiar with a wide range of the world's languages, an encounter with Maricopa is likely to provide a number of surprises, possibly shaking several tacit expectations concerning universals of natural language. At first glance, Maricopa is a rigid verb-final language; however, it is about as different as could be from various stock examples of SOV languages--e.g. Turkish or Japanese. Perhaps the most striking feature of Maricopa grammar is the fact that expressions corresponding to English adjectives, quantifiers, numerals, even conjunctions, are--for the most part--fully fledged verbs in Maricopa. As a result, a large variety of simple clause types in English correspond necessarily to complex clauses in Maricopa--the individual component clauses being related to each other by means of a system of switch reference marking. In order to be in a position to study the syntax and semantics of distributivity in Maricopa, it is necessary to be fully acquainted with the ways in which Maricopa clauses are structured, and, in particular, with the ways in which the notions of number and coordination are expressed. Hence, the importance of the survey of basic grammatical patterns of Maricopa conducted below.

8.1.1 Nouns and Verbs

Like Tagalog and Georgian, Maricopa provides little or no motivation for distinguishing between syntactic categories of common and determined noun phrases; equivalently, Maricopa treats most nouns as mass. Thus, for example, most nouns do not have any form of plural marking, the only exceptions being a small class of animates, e.g. ?ipaa "man", ?ipaaʔ "men"; m̃kay "boy", m̃kaa "boys". Even in these cases, however, plural
marking is not obligatory when semantically appropriate. The following examples show that bare NPs—as in (1a)—enjoy the same privileges of occurrence as NPs qualified by demonstratives, numerals, adjectives, or relative clauses—as in (1b-f):

(1)  
a. Mxay ?yuuk  
   boy 1-saw-sg-real  
   "I saw a/some/the boy(s)"

b. Mxayn’ ?yuuk  
   boy-dem 1-saw-sg-real  
   "I saw the boy(s)"

c. Mxay ćumpap ?yuuk  
   boy four-sg 1-saw-sg-real  
   "I saw (the) four boys"

d. Mxay xmi? ?yuuk  
   boy tall-sg 1-saw-sg-real  
   "I saw a/some/the tall boy(s)"

e. Mxay kWśvarn’ ?yuuk  
   boy rel-sang-sg-dem 1-saw-sg-real  
   "I saw the boy who sang"

f. Mxay kWćumpapn’ ?yuuk  
   boy rel-four-sg-dem 1-saw-sg-real  
   "I saw the boys who number four"

There is, then, little or no reason for distinguishing between common and determined noun phrases in Maricopa.

In examples (1c-f), the noun mxay is directly modified by a numeral, adjective, or relativized expression. More typical, however, are the following constructions, in which the numeral, adjective, or relativized expression occurs, instead, as a main verb:

256
(2) a. Mxays\^\text{\textasciitilde} cumpapk
   boy-dem-nom 3-four-sg-real
   "Some/the boys number four"

b. Mxay\^\text{\textasciitilde} xmiik
   boy-dem-nom 3-tall-sg-real
   "A/the boy is tall"

c. Mxay\^\text{\textasciitilde} a\text{\textasciitilde}vark
   boy-dem-nom 3-sang-sg-real
   "A/the boy sang"

Maricopa would thus appear to offer little reason to assign cumpapk,
xmiik, and a\text{\textasciitilde}vark above to different syntactic categories; all three
forms may occur in the same syntactic environments, and may exhibit the
same range of verbal morphology. Thus, for example, in (3) below, the
three stems cumpapk, xmiik, and a\text{\textasciitilde}vark are marked with the same sequence of
verbal affixes: second person prefix m\text{-}, suffix -nt glossable as "also",
future suffix -uum, and inferential suffix -\text{\textasciitilde}saa; each of the three forms
is--as indicated by its English gloss--a complete sentence.

(3) a. M\text{\textasciitilde}cumpaptuuum\text{\textasciitilde}saa
   2-four-sg-also-fut-inf
   "You will probably also number four"

b. M\text{\textasciitilde}xmiintuuum\text{\textasciitilde}saa
   2-tall-sg-also-fut-inf
   "You will probably also be tall"

c. M\text{\textasciitilde}a\text{\textasciitilde}varntuuum\text{\textasciitilde}saa
   2-sing-sg-also-fut-inf
   "You will probably also sing"

Example (3) thus indicates that there is little or no justification for
posing distinct syntactic categories for numerals or adjectives in
Maricopa: cumpapk "four" and xmiik "tall" are--like a\text{\textasciitilde}vark "sing"--verbal
stems.
Example (3) above provides some indication of the canonical structure of Maricopa verbs, consisting of a number of sequential affix classes. This structure is represented schematically in (4a), beneath which—in (4b)—the particular morphemes instantiating this pattern in (3) are presented. (Scheme (4a) is adapted from Gordon 1981:191.)

(4) a. PROCLITIC - PREFIX - STEM - NON-FINAL - FINAL - ENCLITIC

  \[ \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \] 
  b. \[ \emptyset \ m \ \text{umpap} \ nt \ uum \ ^\text{saa} \] 

\[ \text{xmii} \] 
\[ ^\text{svar} \] 

In this chapter, we shall be particularly interested in two of the above affixes: the non-final suffixes, of which the marker of distributivity -xper is a member, and the final suffixes, containing the two switch reference markers.

The non-final suffixes have, in general, a "logical" flavour. In addition to the marker of distributivity -xper, Gordon (1981:125-135) lists the following non-final suffixes:

(5) a. -t focus, contrast
b. -nt "again, too, as well, some more"
c. -pa "as well as, along with, also"
d. -pat "as well as, too"
e. -xot\text{ }Y "very, a lot"
f. -xpuk "first"
g. -xaay "still, yet, just"
h. -ma negation
i. -tam "this time, now"

258
All of the non-final suffixes may be combined with numerals. Thus, suffixation of -xper produces a series of distributive numerals, for example:

(6) Distributive Numerals

\[ \text{cumpap} \xrightarrow{\cdot} \text{cumpaxper} \]

"four" \quad "four each", "sets of four"

In other cases, non-final suffixes may yield numeral series of the sorts commonly attested in other languages:

(7) a. Restrictive Numerals

\[ \text{cumpap} \xrightarrow{\cdot} \text{cumpapt} \]

"four" \quad "only four"

b. Non-Increasing Non-Decreasing Numerals

\[ \text{cumpap} \xrightarrow{\cdot} \text{cumpaxot} \]

"four" \quad "exactly four"

Non-final suffixes may be combined, resulting—in the case of numerals—in combined numeral series:

(8) a. Distributive Restrictive Numerals

\[ \text{cumpap} \xrightarrow{\cdot} \text{cumpaxpert} \]

"four" \quad "only four each", "only sets of four"

b. Distributive Non-Increasing Non-Decreasing Numerals

\[ \text{cumpap} \xrightarrow{\cdot} \text{cumpaxperxot} \]

"four" \quad "exactly four each", "exactly sets of four"

Turning, now, to the class of final suffixes, these are of particular importance for the proper understanding of switch reference and clause structure. Many of the verbal forms cited in this chapter contain a realis suffix denoting either present or past tense (for ease of
exposition, the English gloss is generally provided in the past tense). The form of this suffix is either -k or -m, being determined by the lexical class of the verb stem and by the suffixes, if any, preceding it. (See Gordon 1979 for detailed discussion.) The three verbs cited in (2)—cumpp "four", xmii "tall", and asvar "sing", are all k-verbs; other k-verbs cited in this chapter include paay "carry", naw "noisy", yuu "see", and all the numerals. The class of m-verbs is perhaps somewhat smaller; however, we shall encounter one important member—yuu "be". The forms of the realis marker are determined also by whatever additional suffixes occur between it and the verbal stem. In general, if another suffix occurs between it and the stem, then the form of the realis marker is -k, regardless of the lexical class of the verb.\(^5\)

Thus, for example, yuu + m "be-sg-real", but yosi + k "be-dual-real", yuxper + k "be-dual-dist-real", etc. This particular example will be of particular importance in our analysis of conjunctions in section 8.4.1.

8.1.2 Switch Reference

The picture is complicated, however, by the fact that in addition to their role as realis markers, the final suffixes -k and -m double as markers of switch reference. Let us return, now, to examples (1) and (2), and see how the verbal modifiers as in (2) are embedded in sentences such as those in (1):

(9) a. Mxay\vs \vculmpam yuuk (cf. (1c),(2a))
boy-nom 3-four-sg-ds 1-saw-sg-real
"I saw (the) four boys"
b. Mxay y miim ?yuuk  
   boy-nom 3-tall-sg-ds l-saw-sg-real 
   "I saw a/some/the tall boy(s)"

(cf. (1d),(2b))

c. Mxay a svarm ?yuuk  
   boy-nom 3-sing-sg-ds l-saw-sg-real 
   "I saw the boy who sang"

(cf. (1c),(2c))

Sentences (9a-c) are synonymous to (1c-e) respectively, and—as previously noted—represent a more common construction type than (1c-e). In (9)—as in (2)—the nominative suffix -y indicates that mxay "boy" is the subject of its respective verbs cumpam "four", xiim "tall", and a svarm "sing". However, the different subject suffix -m indicates that the subject of these verbs, mxay "boy", differs from the subject of the main verb yuuk "saw", which is the first person pronominal prefix -.

The form of the switch reference markers is governed by the same factors as the form of the (homophonous) realis markers. The different subject marker is always -m. However, the same subject marker may be either -k or -m; it is -k in those environments (after a k-verb stem, or after most suffixes) where the form of the realis marker would be -k, and it is -m in those environments (primarily after an m-verb stem) in which the form of the realis marker would be -m. These facts may be summarized as follows:

(10)

\[
\begin{array}{ccc}
\text{SAME SUBJECT} & \text{AFTER m-VERB STEM} & \text{AFTER k-VERB STEM, OR} \\
& -m & -k \\
\text{DIFFERENT SUBJECT} & -m & -m \\
\end{array}
\]
Thus, for m-verbs, the switch reference marking system of Maricopa is essentially neutralized. (This is the reason why most of the examples chosen are of k-verbs; however, as noted above, one important verb, šuu "be", is an m-verb--and we shall consequently be unable to differentiate between same and different subject markings on šuu, when it does not contain any additional suffixes.)

What is the most appropriate syntactic analysis of constructions such as those presented in (9)? I am aware of no extensive discussion of this question in the literature on Maricopa, or on closely related languages. At least three alternative approaches to switch reference clauses suggest themselves; these are illustrated in (11)-(13) below--as they might apply to sentence (9a) incremented by an optional first person subject pronoun n'aa:

(11) **Crazy Morphology Approach**

```
S  
   NP   VP
       
       NP  
       
       NP  Mod
       
       NP  
       mxays  šumpapm

(n'aa)  ?yuuk
```

(12) **Adverbial Approach**

```
S      VP
   
   NP   S   VP
       
       NP   
       mxays  šumpapm

(n'aa)  ?yuuk
```
In (11), the syntactic structure of (9a) is similar to that of (1c)--and their English glosses: mxays cumpapm is an NP consisting of an NP plus a modifier. Approach (11) lays a heavy burden on the morphology, which must explain the presence of the nominative suffix \( -\mathbf{a} \) within a direct object NP, as well as that of the different subject switch reference marker \( -\mathbf{m} \). But this is certainly not a completely unreasonable requirement. In (12)--suggested by Munro (personal communication)--the switch reference clause is interpreted as adverbial; in accordance with (12), sentence (9a) might be glossed more faithfully as "I saw three-boys-ly". Approach (12) puts a heavier burden on the semantics, which must assign--according to context, presumably--the appropriate thematic relation, that of patient, to the adverbial clause. In (13), the switch reference clause is a sentential NP. Approach (13) accounts most straightforwardly for the morphology and semantics of sentences such as (9), but at the price of greater syntactic complexity.8

To adequately defend one of these three approaches against the other two would require a much deeper understanding of Maricopa grammar than I have at my disposal—not to mention, also, considerably more
space than is presently available. In actual fact, I would not be surprised if it emerged that Maricopa made use of all three structure types, in different environments and contexts. In lieu of adequate grounds for a better informed choice, we shall—for ease of exposition—assume, without any attempt at justification, the approach illustrated in (13), involving the postulation of a sentential NP constituent.

In accordance with the sentential NP approach, sentences such as (9) are complex sentences, even though their English translations are simple ones. (This generalization holds true also under the adverbial approach represented in (12).) Maricopa syntactic structures are thus typically of greater depth than their English counterparts, which may be characterized as more flat, or shallow. This property of Maricopa is epitomized by sentence (14) below:

(14) Mxaas v cumpapk v xsmee k ašuuv e v ?yuuk boys-nom 3-four-sg-ss 3-tall-pl-ss 3-sing-pl-ds l-saw-sg-real "I saw four tall singing boys"

Unlike its English gloss, which is a simple sentence with three stacked nominal modifiers, Maricopa (14) contains no less than four nested clauses, tied together by its system of switch reference. Thus, same subject marker -k on cumpap indicates that the subject of cumpap is identical to the subject of xsmee (i.e. mxaaš); same subject marker -k on xsmee indicates that the subject of xsmee is identical to the subject of ašuuv e (again mxaaš), but different subject marker -m on ašuuv e indicates that the subject of ašuuv e (mxaaš) is different from the subject of the main verb yuu (the prefix ?-). We shall have occasion to consider several such multiply embedded structures in section 8.4.
8.1.3 Conjunctions

Perhaps the most unusual feature of Maricopa from the point of view of an English speaking linguist—or, for that matter, an Aristotelian-Boolean logician—are the constructions volunteered by speakers of Maricopa as translations of English sentences involving conjunctions. For example, English sentences (13a,b) may be translated, inter alia, as in (14a,b), (15a,b), or (16a,b) respectively:9

(13)9a.a. John and Bill will come
b. I saw John and Bill

(14) a. John-ś Bill-ś vʔaawuum
   John-nom Bill-nom 3-come-pl-fut

  b. John Bill nʔiʔyuuk
     John Bill pl:obj-l-saw-sg-real

(15) a. John-ś Bill ʔaavk vʔaawuum
     John-nom Bill 3-accompany-sg-ss 3-come-pl-fut

  b. John-ś Bill ʔaavm nʔiʔyuuk
     John-nom Bill 3-accompany-sg-ds pl:obj-l-saw-sg-real

(16) a. John-ś Bill-ś nʔiʔuuum vʔaawuum
     John-nom Bill-nom pl:obj-3-be-sg-ss/ds 3-come-pl-fut

  b. John-ś Bill-ś nʔiʔuuum nʔiʔyuuk

In view of the syntactic diversity exhibited by (14)-(16), it is doubtful whether Maricopa may, in any sense, be meaningfully characterized as possessing a syntactically and semantically coherent structural type of conjunctions.10 However, we shall continue using the term "conjunction" to refer to those constructions that are offered by speakers of
Maricopa as translations of conjunctions in English. Let us now consider the properties of these in a little more detail.

One common strategy for nominal coordination—illustrated in (14)—involves simply juxtaposing the individual conjuncts without any connectives—each conjunct is subsequently case marked in accordance with its role in the clause, which, of course, is identical to that of the other conjuncts. There is, however, good reason to believe that sentences such as (14) do not offer bona fide instances of conjunction. Consider the following sentence, obtained from (14) by addition of the inferential enclitic -ṿaa to the main verb ṿawuum:

(17) John-ṿ Bill-ṿ ṿawuum-saa
      John-nom Bill-nom 3-come-pl-fut-inf

Surprisingly, sentence (17) may be volunteered as a translation of the English sentence John or Bill will come, involving a disjunction rather than a conjunction of NPs. If we are to attempt to provide a compositional semantics for (17)—one where the meaning of the whole is derived through plausible operations from the meanings of the component parts—then sentences (14a) and (17) lead inescapably to the conclusion that the sample juxtaposition of NPs in Maricopa—e.g. John-ṿ Bill-ṿ, is vague as to whether it is interpreted as a conjunction or a disjunction, the appropriate interpretation being determined by other factors, such as the mood of the verb. Thus, rather than conjunctions, the constructions in (14) ought more appropriately to be characterized as mere "junctions". However, since they do not interact in any way with the syntax and semantics of distributivity, we shall have no further occasion to consider this construction type here.

266
Sentences (15) and (16) contain—in addition to the two conjuncts and a sentence-final main verb—an additional "conjoining" verb: ḫaavk "accompany" in (15), and ṣuu "be" in (16). That these are verbs is indicated by the fact that the following constructions may be interpreted as complete sentences:

(18) John-š Bill ḫaavk
     John-nom Bill 3-accompany-sg-real
     "John accompanies Bill"

(19) John-š Bill-š ṣuu
     John-nom Bill-nom 3-be-sg-real
     "They are John and Bill"

In contrast with their English translations, sentences (15) and (16) are thus multi-clausal, containing—as embedded clauses with switch reference markings—the sentences indicated in (18) and (19) above.

In accordance with the sentential NP approach to the analysis of switch reference clauses illustrated in (13), the structure of, say, (15a), may be represented as follows:

(20)

```
      S
     /|
   S  NP
     /|
   NP VP
     /|
   John-š Bill ḫaavk ṣuu
       v?aaωuuum
```

The different case marking of the two conjuncts is accounted for by the fact that the former is the subject of ḫaavk, whereas the latter is its
object. The same subject marker on uŋaav is due to the fact that the subject of uŋaav—John—, is contained in the subject of vŋaawum—the sentential NP John—Bill—uŋaav: as argued by Munro (1979) for closely related Majave, such containment may constitute a sufficient condition for the occurrence of a same subject marker. An analogous structure may be posited for sentence (15b), in which the sentential NP is the direct object—not the subject—of the main verb, thereby accounting for the fact that uŋaav receives a different subject switch reference marker.

The analysis of sentences such as (16) is, however, more complicated. The occurrence of the nominative case marking suffix -v on both NPs would appear to indicate that they are the subject of the conjoining verb ŋuum; on the other hand, ŋu is marked with the plural object proclitic V,i-, seeming to indicate that the two conjuncts are its object. In order to elucidate the structure of conjunctions such as (16), it is necessary to consider the form of predicate nominal constructions in Maricopa:

(21) a. John k'w'seδeš v ŋuum
   John doctor-nom 3-be-sg-real
   "John is a doctor"

b. K'w'seδeš v ŋu
   doctor-nom 3-be-sg-real
   "He/she is a doctor"

As indicated in (21), the nominative suffix -v occurs on the predicate NP (k'w'seδe), rather than on the logical subject (John in (21a), a zero pronominal form in (21b)). As argued by Munro (1977) for Yuman languages in general, and by Gordon (1981:37-39) for Maricopa, the structure of predicate nominal constructions such as (21) is as follows:

268
Since (19)—contained in (16)—is also a predicate nominal construction, we may now combine analysis (22) above with the sentential NP approach to switch reference clauses, in order to represent the structure of, say, (16a), as follows:

In (23), the nominative suffix -\( \tilde{s} \) on both conjuncts results from their being contained in the subject NP of the verb \( \tilde{\text{d}u} \text{um} \). Since \( \tilde{\text{d}u} \text{um} \) is an \( m \)-verb, its final suffix -\( m \) is neutral with respect to the distinction between same and different subject; however, as we shall see in section 8.4.1, if a non-final suffix, e.g. -xper, were attached to the verbal stem \( \tilde{\text{d}u} \text{u} \) in (16a), the verb would take the same subject marker -\( k \), since its subject is identical to that of the higher verb \( v\tilde{a} \text{aw} \text{uum} \). Contrariwise, if a non-final suffix were added to \( \tilde{\text{d}u} \text{u} \) in (16b), the final suffix
would remain -m, since the subject of \( \text{Si} \) differs from that of the higher verb \( \text{ni'yuuk} \).

In (23), we have posited rather a lot of syntactic structure for what corresponds to quite a simple clause in English—John and Bill will come. To fully justify such a structure would—as noted previously—require a far deeper investigation into the grammatical patterns of Maricopa than is at present feasible. However, some support for (23) may be derived from considerations pertaining to distributivity, which are of interest to us here. Recall, from section 4.2.3, the parallel drawn between the interpretations of (30b) They are doctors and lawyers and of (30c) Doctors and lawyers—both constructions allowing for one class of interpretations involving doctor-lawyers, and another class involving some doctors and some lawyers. In order to account for these two classes of interpretations, conjunctions such as doctors and lawyers were suggested to contain two logical constituents, DOCTOR AND LAWYER and UNITS, between which two classes of scope relations may obtain.

Observe, now, that the covert logical classifier constituent UNITS fits nicely into the empty NP node to the left of the two conjuncts in tree (23). Sentence (16a)—represented in (23)—may accordingly be read off roughly as follows: "[s They/units are John and Bill] will come". Thus, at least some of the "extra" syntactic structure posited in (23) corresponds suggestively well to the "extra" logical structure posited for conjunctions such as doctors and lawyers in chapter 4.

In section 8.4.1, we shall see that conjoining verbs such as \( \text{Si} \) may occur with the distributive suffix -xper. The existence of overtly marked distributive conjunctions will provide further support for our
analysis of phrases such as doctors and lawyers in terms of conjunction-
internal scope relations—and, ipso facto, for the type of syntactic
structure posited for Maricopa conjunctions in (23). However, we shall
also find that the semantics of conjunctions containing -xper poses
serious problems to the syntactic analysis presented in this section.

This concludes our analysis of the major syntactic patterns of
Maricopa. As we have seen, the most salient feature of Maricopa grammar
is the verbal character of expressions corresponding to adjectives,
umerals, and conjunctions—as a result of which Maricopa sentences are
often considerably more complex than their English counterparts. In
the remainder of this chapter, we shall see how these properties inter-
act with the syntax and semantics of distributivity in Maricopa.

8.2 The Verbal Distributive Suffix -xper

The non-final verbal suffix -xper is the most common device for
marking distributivity in Maricopa; -xper may be suffixed to any verb
whatsoever, including those corresponding to adjectives, conjunctions,
and—of course—numerals in English. In most cases, the semantics of
-xper is quite straightforward, resembling that of reduplication in
Georgian, discussed in the previous chapter. We shall consider, in
turn, verbs marked with -xper in simple and complex clauses.

8.2.1 Simple Clauses

In the following sentences, the main verb is marked with -xper;
the semantic effect of -xper in each case is to force the verb to
distribute over its subject NP:
(24) a. Mxaas ăsuvuarxperk
   boys-nom 3-sang-pl-dist-real
   "Some/the boys each sang"

b. Mxaas naawxperk
   boys-nom 3-noisy-pl-dist-real
   "Some/the boys are each noisy"

c. Mxaas xmoPxperk
   boys-nom 3-three-sg-dist-real
   "Some/the boys are in sets of three"

While ăsuvə in (24a) corresponds to a verb in English, naaw in (24b) corresponds to an adjective, and xmo in (24c) is a numeral. In Maricopa, however, all three are verbal stems; accordingly, we may provide a unified analysis of distributivity for all three sentences above:

(25) a. [\[S\ UNIT[S] BOY\] SING-DIST]
   Units of boy each sang

b. [\[S\ UNIT[S] BOY\] NOISY-DIST]
   Units of boy are each noisy

c. [\[S\ UNIT[S] BOY\] THREE-DIST]
   Units of boy each number three

The semantics of the distributive numeral xmoPxperk thus parallels completely the semantics of other distributive verbs, e.g. ăsuvuarxperk and naawxperk—the only difference being that while in (25a,b) the units are interpreted (by default) as individual boys, in (25c) they are interpreted as sets of boys, whose cardinality is stipulated by the distributive numeral. Thus, since numerals are a subclass of verbs in Maricopa, distributive numerals are a subclass of distributive verbs—xper has the same effect, of inducing distributivity, in both cases.
Our analysis of -xper in Maricopa thus parallels closely that of reduplication in Georgian. Just as—(19) and (14)—reduplication forces both sami "three-nom" and ḥkari "fast-nom" to distribute over their heads, so -xper above forces both both xmok "3-three-sg" and naaw "3-noisy-pl" to distribute over their heads. In both Georgian and Maricopa, then, distributive numerals are a subclass of a larger category of distributive expressions, and the semantics of distributive numerals falls out straightforwardly—and in identical fashion—from that of the larger distributive category. Thus, distributive numerals xmokxperk and sam-sami are essentially synonymous, forcing an organization of their head noun into sets of three.

However, distributive numerals in Georgian and Maricopa exhibit an important distinction—one due not to any differences between reduplication and -xper as markers of distributivity, but, rather, to a more fundamental difference between the grammars of both languages. To wit, sam-sami is an adjective, while xmokxperk is a verb. Hence, sam-sami may force phrasal distributivity (over its head, as in, say, the NP sam-sami bavsvebi "three-dist-nom boys-nom"), while xmokxperk may only force clausal distributivity—as in, say, (24c). More generally, -xper always induces clausal distributivity of a verbal phrase over its head. How this works in complex clauses we shall see next.

8.2.2 Complex Clauses

As evidenced by the examples in (1) and (2) chapter 2, most languages have different strategies for expressing phrasal and clausal distributivity. Thus, for example, in Georgian reduplication permits
either phrasal or clausal distributivity (with a preference for phrasal), while tito forces clausal distributivity. In Maricopa, however, the characteristically complex clause structure provides for a situation in which both class A and class C of interpretations of sentences such as (1) and (2) in chapter 2 arise out of clausal distributivity. It is hence not surprising to find that Maricopa—alone of the languages exemplified in chapter 2—makes use of the same morphosyntactic strategy, namely, suffixation of -xper, to form both distributive numerals forcing class C of interpretations—as in (1j), and distributive verbs forcing class A of interpretations—as in (2j). These sentences are reproduced below:  

(26) a. ?ipac xvikk ?ii xmokxperm paayşik
   men-nom 3-two-sg-ss stock 3-three-sg-dist-ds 3-carried-dual-real

b. ?ipac xvikk ?ii xmokm paayxperśik
   men-nom 3-two-sg-ss stick 3-three-sg-ds 3-carried-dist-dual-real

The analysis of these sentences is quite simple:

(27)  

In (26a), distributivity obtains within the clause ?ii xmokxperm, which is embedded (as a sentential NP) within a higher clause; as a result,
(26a) has class C of interpretations only. In (26b), however, it is the matrix verb paay that is marked with -xper; (26b) admits only class A interpretations. In order to account for the semantics of (26b), it is necessary to assume that the verb paayxpersik distributes together with its direct object ?ii xmokm over its subject NP head ?ipac xvikk. (If the verb alone distributed over its subject, then there would be no way of accounting for the fact that (26b) entails the existence of two men and six sticks, and not, say, six men and three sticks.) The semantics of (26b) thus provides strong support for the existence of a VP constituent in a rigid verb-final language—Maricopa.16

In both (26a) and (26b), then, -xper forces the lowest NP node dominating it to distribute over the VP’s head NP. In (26a), -xper forces xmok to distribute over ?ii in the embedded clause; it cannot force ?ii xmokxperm paayysik to distribute over ?ipac xvikk because ?ii xmokxperm paayysik is not the lowest VP node dominating -xper. In (26b), however, ?ii xmokm paayxpersik is the lowest VP dominating -xper, hence, it distributes over its head NP ?ipac xvikk. Thus, a simple semantic rule for -xper, in conjunction with judiciously chosen syntactic structures, suffices to account for the semantics of (26a) with class C interpretations, and (26b) with class A interpretations.17

In most constructions, then, the semantics of -xper is quite straightforward, forcing the lowest VP dominating it to distribute over the VP’s head. In section 8.4, however, we shall examine some construction types involving complex clauses, which present a problem to the present analysis.
8.3 Verbal Ablaut: Plurality or Distributivity?

Before doing so, however, we shall take a brief respite in our analysis of the suffix -xper, in order to consider another morphological device of relevance to an investigation of distributivity and distributive numerals in Maricopa. As stated in section 8.1.1, numerals display the entire range of Maricopa verbal morphology. However, the observant reader may have wondered why all the numeral forms exemplified so far have been glossed as singular. In fact, numerals—like any other verbs—may occur in either singular or plural forms. As shown in Thomas-Flinders (1981), one of the more productive strategies for forming plural verbs is ablaut, with concomitant vowel lengthening. As indicated below, this strategy is used also to form plural numerals.\(^{18}\)

(28) Plural Numerals in Maricopa

<table>
<thead>
<tr>
<th>Singular Numerals</th>
<th>Plural Numerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 1 šent</td>
<td>Šsiint</td>
</tr>
<tr>
<td>b. 2 xvik</td>
<td>xvaak</td>
</tr>
<tr>
<td>c. 3 xmok</td>
<td>xmuuk</td>
</tr>
<tr>
<td>d. 4 čumpap</td>
<td>čumpaap</td>
</tr>
<tr>
<td>e. 5 sarap</td>
<td>saraap</td>
</tr>
<tr>
<td>f. 10 šaxuk</td>
<td>šaxuuk</td>
</tr>
</tbody>
</table>

What are the uses of plural numerals in Maricopa? As a rule, the syntax and semantics of plural numerals are identical to those of singular numerals suffixed with -xper. Thus, for example, (29a) and (29b) are synonymous, as are (30a) and (30b):

(29) a. Šmxaas \(\text{xmokxperk}\) \(=\text{(24c)}\)

boys-nom 3-three-sg-dist-real

276
b. Mxas  xmuukk
    boys-nom 3-three-pl-real

    "Some/the boys are in sets of three"

(30) a. ?ipac  xvikk  ?ii  xmoxxperm  paasik
    men-nom 3-two-sg-ss stick 3-three-sg-dist-ds 3-carried-dual-real
    (=ljb chapter 2 = (26a))

b. ?ipac  xvikk  ?ii  xmuukm  paasik
    men-nom 3-two-sg-ss stick 3-three-pl-ds 3-carried-dual-real

    "Two men carried sets of three sticks"

Interestingly, these two morphological strategies—suffixation of -xper
and ablaut—may be combined, yielding a series of distributive plural
numerals, e.g. xmuukxper "3-three-pl-dist".19

Although plural numerals are synonymous with distributive numerals,
it does not follow automatically that they are distributive numerals;
that is, it does not follow that they ought to be analyzed as inducing
a relation of distributivity between a dominating VP constituent and
its NP head.20 In fact, there would appear to be at least one good
reason not to consider plural numerals as distributive. Consider the
following paradigm:

(31) a. Mxayn'is  ʕsvark
    boy-dem-nom 3-sang-sg-real
    "The boy sang"

b. *Mxayn'is  ʕsvarxperk
    boy-dem-nom 3-sang-sg-dist-real
    "The boy each sang"

c. Mxayn'is  ʕsuuvark
    boy-dem-nom 3-sang-pl-dist-real
    "The boys sang"
d. Mxayn'ís aśuuvaxperk
   boy-dem-nom 3-sang-pl-dist-real
   "The boys each sang"

(32) a. Mxayn'ís xmókk
   boy-dem-nom 3-three-sg-real
   "The boys number three"
b. Mxayn'ís xmókxperk
   boy-dem-nom 3-three-sg-dist-real
   "The boys are in sets of three"
c. Mxayn'ís xmuukk
   boy-dem-nom 3-three-pl-real
   "The boys are in sets of three"
d. Mxayn'ís xmuukxperk
   boy-dem-nom 3-three-pl-dist-real
   "The boys are in sets of three"

The above sentences attest to a less than perfect parallel between the paradigms for aśvark "sang" in (31) and xmókk "three" in (32). To begin, note that while the singular distributive form xmókxperk in (32b) is grammatical, its counterpart aśvarxperk in (31b) is not. (The reason for this is that xmók forces the denotation of its head to be a single set, aśvar forces the denotation of its head to be a single individual—thereby blocking distributivity just like its English gloss.) Of greater interest to us here, however, is the fact that while ablaut and -xper have an identical semantic effect upon xmók in (32), their effect upon aśvar in (31) is not the same. In particular, the plural verbal form aśuuvark in (31c) is, unequivocally, not distributive. If—as were the case for -xper in the previous section—we are to strive for a unified analysis of ablaut with respect to numerals, e.g. xmuukk in (32c), and
other verbs, e.g. asuuvark in (31c), the semantics of asuuvark indicates quite clearly that such an analysis cannot be based on the notion of distributivity. 21

Nevertheless, the weight of the evidence would appear to lean in favour of a distributive analysis of plural numerals in Maricopa. To begin, numerals with -xper and with ablaut evince similar behaviour with respect to the grammatical relations hierarchy governing distributivity. Thus, while both types of numeral may occur freely within a direct object NP—as in (33), the corresponding constructions—in (34)—where a numeral with -xper or ablaut occurs within a subject NP were judged by the speaker I consulted to be awkward, and difficult to interpret:

(33) a. ?ipač xvikk ?ii xmoxxperm paasvík
   men-nom 3-two-sg-ss stick 3-three-sg-dist-ds 3-carried-dual-
   (=Ij) chapter 2 = (26a),(30a)
   b. ?ipač xvikk ?ii xmuukm paasvík (=30b)
   men-nom 3-two-sg-ss stick 3-three-pl-ds 3-carried-dual-real

(34) a. ?ipač xvikxperk ?ii xmoxxm upaaavk
   men-nom 3-two-sg-dist-ss stick 3-three-sg-ds 3-carried-pl-real
   b. ?ipač xvaakk ?ii xmoxxm upaaavk
   men-nom 3-two-pl-ss stick 3-three-sg-ds 3-carried-pl-real

Both xvikxperk in (34a) and xvaakk in (34b) are judged to be bad for the same reason that, say, Georgian or-orma "two-dist-reg" and Turkish ikis "two-dist" are judged to be awkward in the corresponding sentences in (21) section 5.1.2, and postnominal each in the corresponding English sentence (55b) section 4.3.1—that is, because they violate the grammatical relations hierarchy which contraindicates the occurrence of a
marker of distributivity within a subject NP. The awkwardness of xvaakk in (34b) thus supports the claim that ablaut—when applied to numerals—is a marker of distributivity, just like its counterpart, the suffix -xper, and markers of distributivity in other languages, such as Georgian reduplication, Turkish -per, and English each.

In the next section, we shall encounter additional construction types in which numerals with ablaut and with -xper behave similarly, thereby providing further support for the characterization of plural numerals in Maricopa as distributive.\textsuperscript{22}

\subsection*{8.4 Complex Clauses: A Puzzle}

In sections 8.2 and 8.3, we found that the semantics of verbs suffixed with -xper and of numerals formed with ablaut is quite straightforward, easily amenable to an analysis along the lines proposed in chapter 5. However, there exist a number of constructions in Maricopa involving markers of distributivity which are not so obviously accountable for in terms of the analysis developed until now. These constructions typically involve complex clauses—e.g. conjunctions, stacked numerals—whose structure, regardless of questions pertaining to distributivity, is not crystal clear. In this section, we shall introduce and discuss one particular puzzle pertaining to the interaction of distributivity with certain complex clause structures in Maricopa—and subsequently propose two alternative solutions to the puzzle. The choice between these two solutions will be left open.

\subsubsection*{8.4.1 Conjunctions}

The distinctive syntax of the various strategies used in Maricopa for translating English conjunctions was discussed in section 8.1.3.
Let us consider, now, the following instances of conjunction involving forms of the conjoining verb ḟuu "be", and, in addition, the distributive verbal suffix -xper:

(35) a. John-s Bill-s ḟuu-m n-yiðuum ?ii xmokxperm
   John-nom Bill-nom pl:obj-3-be-sg-ss/ds stick 3-three-sg-dist-ds
   paayśik
   3-carried-dual-real

b. John-s Bill-s ḟuu-m n-yiðuum ?ii xmokm
   John-nom Bill-nom pl:obj-3-be-sg-ss/ds stick 3-three-sg-ds
   paayxpersśik
   3-carried-dist-dual-real

c. John-s Bill-s ḟuu-m n-yiðuxperm ?ii xmokm
   John-nom Bill-nom pl:obj-3-be-dual-dist-ss stick 3-three-sg-ds
   paayśik
   3-carried-dual-real

In sentence (35a), -xper occurs—like in (26a)—on the numeral xmok; the interpretation of (35a) is, as expected, that indicated in (36a).

In sentence (35b), -xper occurs—like in (26b)—on the main verb paay "carry"; again, as expected, the interpretation of (35b) is that indicated in (36b):

(36) a. John and Bill carried sets of three suitcases

    b. John and Bill each carried three suitcases

Sentence (35c) is the surprising one. In (35c), -xper occurs on the conjoining verb ḟuu "be"—and (35c) is synonymous to (35b), being interpreted as in (36b).

Why is this surprising? According to our analysis in section 8.2, -xper forces the lowest VP dominating it to distribute over its head.
Let us now sketch a plausible syntactic structure for (35c), following our analysis of conjunctions in section 8.1.3:

\[(37)\]

In accordance with (37) we would expect \textit{n'iousxperk} to distribute over the NP containing \textit{John-ś Bill-ś} (plus an empty node). What this would mean is perhaps difficult to envisage. However, the interpretation of (35c) indicates clearly that the semantic effect of \textit{xper} when suffixed to the conjoining verb \textit{buu} is identical to its effect when suffixed to the main verb \textit{paay}—namely, to force the main VP constituent to distribute over its head NP; this may be represented as follows:

\[(38)\]

While in (38a), \textit{xper} functions in accordance with the analysis presented in section 8.2, in (38b) the semantic effect of \textit{xper} is inconsistent with that analysis: in (38b) \textit{xper} does not force the lowest VP dominating it (\textit{n'iousxperk}) to distribute over its head NP, but, rather, forces another entirely different VP to distribute over an NP dominating \textit{xper}.
In fact, -xper in (38b) violates a more general characteristic of markers of distributivity encountered throughout this dissertation. In nearly all of the examples considered so far (distributive numerals as well as verbal and adverbial markers of distributivity), the effect of a marker of distributivity has been to force a constituent containing it to distribute over another constituent. The nature of these constituents varied considerably from one example to another; however, it was almost always the case that the marker of distributivity occurred on the constituent with narrow scope—the one that distributes, not on the constituent with wide scope interpreted individually—the one that is distributed over. Sentence (35c) violates this generalization; as indicated in (38b), -xper forces a constituent containing it (the subject NP John’s Bill—is yidu-xperk) to be distributed over by another constituent (the VP ?ii xnom?k paay’sik), rather than, as expected, to distribute over another constituent. The semantics of -xper in (35c) thus presents a problem not only to our analysis of -xper in section 8.2, but, also, to a universal characterization of markers of distributivity—of which the analysis of -xper is a particular instantiation.

The behaviour of -xper in (35c) is, apparently, typical of constructions in which -xper is suffixed to a conjoining verb. We shall now consider some examples involving external distributivity over conjunctions, which raise similar problems of analysis. To begin, note that while (39a) is judged strange for precisely the same reason as its English gloss, (39b) with distributive numeral is acceptable—the distributive numeral distributing externally over the two conjuncts:
(39) a. Naranks k'xtons x'mokm ?wiim
   orange-nom banana-nom 3-three-sg-ds l-have-sg-real
   "I have three oranges and bananas"

b. Naranks k'xtons x'mokxperm ?wiim
   orange-nom banana-nom 3-three-sg-dist-ds l-have-sg-real
   "I have three oranges and three bananas"

Sentence (39b) may now be paraphrased as in the following constructions, involving—in addition to the items contained in (39b)—the conjoining verb ?wuu:

(40) a. Naranks k'xtons n'yīšuum x'mokxperm
   orange-nom banana-nom pl:obj-3-be-sg-ss/ds 3-three-sg-dist-ds
   ?wiim
   l-have-sg-real

b. Naranks k'xtons x'mokxperm n'yīšuum
   orange-nom banana-nom 3-three-sg-dist-ss pl:obj-3-be-sg-ss/ds
   ?wiim
   l-have-sg-real

c. Naranks k'xtons n'yīñoxperm x'mokm
   orange-nom banana-nom pl:obj-3-be-sg-dist-ss 3-three-sg-ds
   ?wiim
   l-have-sg-real

d. Naranks k'xtons x'mokk n'yīñoxperm
   orange-nom banana-nom 3-three-sg-ss pl:obj-3-be-sg-dist-ds
   ?wiim
   l-have-sg-real

"I have three oranges and three bananas"

The above four sentences, all synonymous, exemplify the following syntactic pattern:

284
(41) N-nom N-nom V₁-ss V₂-ds V₃-real

The same subject marker on V₁ (except in (40a), where the same/different subject distinction is neutralized by the m-verb kuu) indicates that the subject of V₁ is identical to the subject of V₂, while the different subject marker on V₂ (except in (40b), where the distinction is neutralized again) indicates that the subject of V₂ is different from the subject of V₃, i.e. of twim.

The grammaticality and synonymy of all four sentences in (40) is, once again, rather surprising. Sentence (40a) is perhaps the construction one would expect the most, with the conjoining verb kuu in V₁ position, and the numeral xmk as V₂ marked with -xper. Sentence (40b) is somewhat puzzling syntactically; in (40b), the conjoining verb n'īk'ūum seems to have "floated away" from its conjuncts, occurring in V₂ position. The same subject marker -k on xmkxper would seem to indicate that n'īk'ūum is indeed the verb of a higher clause than xmkxper.

Sentence (40c) is puzzling semantically; in fact, it presents exactly the same problem of analysis as (35c). In (40c), the distributive suffix -xper occurs on the conjoining verb kuu in V₁, rather than on the numeral xmk in V₂, as in (40a). Nevertheless, sentence (40c) is synonymous with (40a), the numeral xmk distributing externally over the conjunction narakas xmtonic n'īxoxperk. In (40c), as in (35c), the suffix -xper fails to produce the usual semantic effect: rather than forcing the VP to which it belongs—n'īxoxperk—to distribute over it head NP, it forces the conjoined NP to which it belongs to be distributed over by its own VP—in the case at hand, the numeral xmkm. The parallel between (35c) and (40c) may be represented as follows:
(42) a. \[\text{[John's Bill's n'\text{y}io\text{n}x\text{per}k]} \leftrightarrow [\text{?i\text{mokm paay'}\text{ik}}]= (38b)\]

b. \[\text{[Narak's k\text{'xton's n'\text{y}io\text{n}x\text{per}k]} \leftrightarrow [\text{xmokm] wiim}\]

Finally, sentence (40d) presents both the syntactic puzzle of (40b) and the semantic puzzle of (40c)—violating, to boot, a most elementary principle of compositionality. Recall, from (39a), that the sentence/sentential NP \[\text{narak}\text{'s k'xton's xmokk}\] is semantically anomalous, like its English counterpart. But, lo and behold, when embedded in a favourable syntactic environment—that of (40b), it is salvaged by the distributive conjoining verb \[n'\text{y}io\text{n}x\text{per}m\], forcing (again, in violation of the analysis of \(-\text{xper}\) in section 8.2) the numeral \[\text{xmok}\] to distribute over the two conjuncts of its head. To conclude, then, in (40) the relative order of the two verbs \[\text{xmok}\] and \[\text{\^o\text{u}}\] makes no difference, nor does the location of the distributive suffix \(-\text{xper}\) on either of the verbs. All four sentences are grammatical and synonymous, in spite of their apparently very different structures.

The paradigm evinced by (40) appears to recur quite systematically in Maricopa. In the following example, the conjoining verb is the reflexive \[\text{mat'\text{\text{y}teev}}\ "be together"; since \[\text{mat'\text{\text{y}teev}}\] is a k-verb, the switch reference markings in (43) are—unlike (40)—completely transparent. Of the four sentences in (43), arranged in correspondence to those in (40), one was judged to be ungrammatical (I have no explanation why); the remaining three sentences were all judged to be grammatical and synonymous, as indicated by their common gloss:

(43) a. \[\text{\text{\^o\text{u}}p\text{\text{'\text{i}}} sn'\text{y's\text{ak's mat'\text{\text{y}teev}} \text{xmok\text{xper}m}}\]

\[
\begin{array}{ll}
\text{men-nom} & \text{women-nom} \\
\text{refl} & \text{3-together-pl-ss} \\
\text{3-three-sg-dist-ds} & \\
\text{n'\text{i'yu\text{uk}}} & \\
\text{pl:obj-1-saw-sg-real} & \\
\end{array}
\]
b. ?ipac\^ sn^v^?ak\^ xmokxperk \text{mat}^y \text{teevm} \\
\text{men-nom women-nom 3-three-sg-dist-ss refl 3-three-pl-dist-ds} \\
n^y i^\text{yuuk} \text{pl:obj-1-saw-sg-real} \\
c. *?ipac\^ sn^v^?ak\^ \text{mat}^y \text{teevxperk} \text{xmokm} \\
\text{men-nom women-nom refl 3-together-pl-dist-ss 3-three-sg-ds} \\
n^y i^\text{yuuk} \text{pl:obj-1-saw-sg-real} \\
d. ?ipac\^ sn^v^?ak\^ xmokk \text{mat}^y \text{teevxperm} \\
\text{men-nom women-nom 3-three-sg-ss refl 3-together-pl-dist-ds} \\
n^y i^\text{yuuk} \text{pl:obj-1-saw-sg-real} \\
"I saw three men and three women" \\

Similar facts obtain for other conjoining verbs in Maricopa.\textsuperscript{24} \\

Thus, as indicated by examples (35), (40), and (43), conjoining verbs marked with \text{-xper} present a problem to the analysis developed in section 8.2: rather than forcing the smallest VP containing it to distribute over its head NP, \text{-xper} in construction with conjoining verbs forces the conjoined NP to which it belongs to be distributed over by its VP. In the next section, we shall see that constructions involving stacked numerals with \text{-xper} present an analogous problem.

8.4.2 Stacked Numerals \\

Stacked numeral constructions in Georgian were discussed in detail in section 7.3. Maricopa, too, possesses stacked numeral constructions; however, these differ in interesting ways from their Georgian counterparts. One obvious syntactic difference is indicated in (44) below; while in Georgian there was shown to exist a constraint against
constructions where the "inside" numeral is not distributive—e.g. *or-ori otxi k'aci "two-dist-nom four-nom man-nom", the corresponding constructions in Maricopa are perfectly grammatical:

(44) a. ?ipac ꞇcumpapk xvikxperk
     men-nom 3-four-sg-sx 3-two-sg-dist-real

b. ?ipac ꞇcumpapk xvaakk
     men-nom 3-four-sg-sx 3-two-pl-real

Both (44a) and (44b) predicate the existence of four men, arranged in twos; they may accordingly be analyzed as follows:

(45) [[[S UNITS] MAN] 4] 2-DIST]

Units numbering two each of units numbering four together of man

The interpretation of (44) thus corresponds to one of the possible classes of interpretations of Georgian otxi or-ori k'aci "four-nom two-dist-nom man-nom" (cf. (53b) and (57b) section 7.3), as well as to the interpretation of the English four men in twos (cf. footnote 23 chapter 7).

A surprise is in store, however, when stacked numeral constructions in Maricopa are embedded within larger clauses. Let us comapre the results of embedding Georgian otxi or-ori k'aci and its Maricopa counterpart (44a) as subject NPs within a matrix clause:

(46) a. Georgian

Otxi or-ori k'aci sam ꞇcantas iyëbs
    four-nom two-dist-nom man-nom three suitcase-dat lift-3sg

288
b. Maricopa

ʔipac ʔumpapk ʔvikxperk ʔii xmoxm
men-nom 3-four-sg-ss 3-two-sg-dist-real stick 3-three-sg-ds
upaavk
3-carried-pl-real

In (46a), as expected, the distributive numeral or-ori induces only phrasal distributivity within the subject NP; although the subject NP is multiply ambiguous—as discussed in section 7.3—no relation of distributivity obtains between phrases in the clause. In particular, (46a) entails the existence of three suitcases, and no more. In (46b), however, the situation is more complicated. As in (44a), the distributive numeral ʔvikxperk distributes over its head, the sentential NP ʔipac ʔumpapk. However, in addition, ʔvikxperk forces the VP ʔii xmoxm upaavk to distribute over its head NP ʔipac ʔumpapk ʔvikxperk. As a result, each pair of men carried three sticks. Assuming disjointness of sets of sticks, the total number of sets of sticks carried is thus 4 / 2 x 3 = 6, where 4 / 2 represents the number of pairs of men, and 3 represents the number of sticks each pair carried. Sentence (46b) may accordingly be glossed as follows:

(47) Sets of two men totalling four (men) carried three sticks each (set)

Its analysis is accordingly as in (48):

(48) [[[S UNITS] MAN 4] 2-DIST] [CARRIED 3 STICKS]

As indicated in (48), the distributive numeral ʔvikxperk presents the same problem for the analysis of -xper in section 8.2 as do the distributive conjoining verbs discussed in the previous sections. Of
the two simultaneous relations of distributivity forced by *xvikxperk* in (46b), one is in accordance with the analysis of *-xper*, this is the distributivity of *xvikxperk* over its NP head. However, *xvikxperk* also forces the NP containing it, *?
ipač cumpapk xvikxperk*, to be distributed over by its VP *?ii xomkm upaavk*. In this respect, the semantic effect of *-xper* is identical to that in, say, (35c), where it forces the NP containing it, *John-š Bill-š n'ívůšxperk*, to be distributed over by its VP *?ii xomkm paayšk*. This parallel may be represented as follows:

(49) a. [*John-š Bill-š n'ívůšxperk*] → [*?ii xomkm paayšk*] (38b), (42a)  
    b. [*?
ipač cumpapk xvikxperk*] → [*?ii xomkm upaavk*]

Thus, the problem raised by *xvikxperk* in (46b) is identical to the problem presented by distributive conjoining verbs discussed previously.

At first glance, then, it would appear that conjoining verbs and numerals form a natural class with respect to the irregular behaviour of *-xper*. However, this hypothesis is belied by the following sentence, obtained from (46b) by omitting the numeral *cumpapk* (and with it, an embedded clause):

(50) *?
ipač xvikxperk ?ii xomkm upaavk*

    men-nom 3-two-sg-dist-ss stick 3-three-sg-ds 3-carried-pl-real

As noted in section 8.3, the above sentence is judged to be awkward, since the subject NP contains a distributive numeral. However, its interpretation most certainly does not involve the VP *?ii xomkm upaavk* distributing over its head NP *?
ipač xvikxperk*. Thus, *xvikxperk* in (50) does not function in the abnormal way that it does in (46b)—as represented in (49b). We may conclude, then, that the conditioning
factors for the strange behaviour of -xper are, at least in part, structural, rather than lexical.

Before attempting to study possible solutions to the problem of -xper outlined in the previous pages, it is worth noting that the identical problem is presented also by constructions involving plural numerals. For example, sentence (51) with xvaakk "3-two-pl-s" is synonymous with sentence (46b) with xvikxperk "3-two-sg-dist-ss":

(51) ?ipac čumpapk xvaakk ?ii xmomk

   men-nom 3-four-sg-ss 3-two-pl-ss stick 3-three-sg-ds

   upaavk

   3-carried-pl-real

Like xvikxperk in (46b), xvaakk in (51) forces the main VP to distribute over its head NP:

(52) [?ipac čumpapk xvaakk] ← [?ii xmomk upaavk]

Unlike the other constructions involving plural numerals discussed in section 8.3, there would appear to be no alternative analysis of sentence (51) doing away with the relation of distributivity represented in (52), in order to replace it with some feature connected to the plural character of xvaakk (cf. footnote 21). Sentence (51) thus provides strong support for the distributive nature of xvaakk and other plural numerals in Maricopa. In particular, given that in (51) xvaakk unequivocally induces distributivity, as per (52), it would accordingly seem most appropriate to provide a distributive analysis for xvaakk also in those cases where the relation of distributivity is perhaps less obvious, e.g. over ?ipac čumpapk, also in (46b):
(53) [ʔi[p]ač ʧumpapk] ← [xvaakk] ʔii xmoŋm upaavk

The distributive nature of plural numerals is perhaps most strikingly underscored by the fact that ʃiint "one-pl" is the form most commonly volunteered as a translation of English each. Thus, for example, sentence (26b) = (2j) chapter 2 with class A of interpretations—reproduced below as (54a)—may be paraphrased as in (54b) and (54c), where, instead of the distributive verbal suffix -xper, a form of the plural verb ʃiint occurs:

(54) a. ʔi[p]ač xvikk ʔii xmoŋm
    men-nom 3-two-sg-ss stick 3-three-sg-ds
    paayxperʃiʃiʃ
    3-carried-dist-dual-real

b. ʔi[p]ač xvikk ʃiintik ʔii xmoŋm
    men-nom 3-two-sg-ss 3-one-pl-ss stick 3-three-sg-ds
    paayʃiʃ
    3-carried-dual-real

c. ʔi[p]ač xvikk kʰʃiintʃiʃ ʔii xmoŋm
    men-nom 3-two-sg-ss rel-one-pl-nom stick 3-three-sg-ds
    paayʃiʃ
    3-carried-dual-real

"Two men each carried three suitcases"

Sentence (54b) very closely parallels sentence (51), differing from it only in the particular values of the numerals, and in the number of the main verb paay. Like (51), (54b) contains a stacked numeral expression ʔi[p]ač xvikk ʃiintik, in which the second numeral, the plural ʃiintik, simultaneously induces two relations of distributivity: one, of ʃiintik itself over ʔi[p]ač xvikk, the other of ʔii xmoŋm paayʃiʃ over ʔi[p]ač xvikk.
śiintík. These two relations of distributivity, represented below, contribute in concert to the equivalence between plural numeral śiintík and postnominal each in English;\textsuperscript{26}

(55) \begin{itemize}
\item a. \TODO{[?ipac xvikk] ← [śiintík] ?ii xmokm paaysík}
\item b. \TODO{[?ipac xvikk śiintík] ← [?ii xmokm paayšík]}
\end{itemize}

Sentence (54c) contains a relativized form of the plural numeral śiinti---it is otherwise identical to (54b).\textsuperscript{27}

In other constructions, śiintík corresponds to prenominal each in English:

(56) Mxays śiintík əsvark
    boys-nom 3-one-pl-sg 3-sang-sg-real
    "Each boy sang"\textsuperscript{28}

As for (54b,c), the analysis of (56) involves two simultaneous relations of distributivity:

(57) \begin{itemize}
\item a. \TODO{[Mxays] ← [śiintík] əsvark}
\item b. \TODO{[Mxays śiintík] ← [əsvark]}
\end{itemize}

As indicated by (57), a more revealing gloss for (56) would be "Sets of one boy each sang".

Thus, in sentences (51), (54b,c) and (56), plural numerals---most often within stacked numeral constructions---present the same problem as do numerals and conjoining verbs suffixed with -xper. In these sentences, plural numerals induce, simultaneously, two distinct relations of distributivity. While the first of these relations---e.g. that indicated in (57a)---corresponds to that predicted by the analysis of plural numerals in section 8.3, the second---e.g. that represented in (57b)---is

293
inconsistent with the analysis of plural numerals, and in addition, with
the universal generalization that was suggested to underly the corre-
sponding analysis of -xper. Thus, while in most cases, markers of
distributivity force a constituent in which they occur to distribute
over some other constituent, in examples such as (57b), the marker of
distributivity (e.g. \textit{Siintik}) forces a constituent in which it occurs to
be distributed over by some other constituent. We shall now begin to
explore some possible approaches towards solving the problems posed by
the constructions discussed in the last two subsections.

8.4.3 Two Possible Approaches

There are, it would seem, two alternative ways of going about try-
ing to account for the constructions considered in the previous two
sections—these might be characterized, grossly, as the "syntactic ap-
proach" and the "semantic approach" respectively. The syntactic ap-
proach entails, basically, redefining the syntactic structures of the
problematic sentences in such a way that their semantics will come out
right under the present analysis of distributivity—that proposed in
previous sections of this chapter. The semantic approach involves, on
the other hand, modifying the analysis of -xper developed in section
8.2—and the concomitant analysis of ablaut in section 8.3—in order to
account for the semantics of the sentences in question, without propos-
ing alternative syntactic structures. Both approaches, it would seem,
have some merit, but, also, many drawbacks—and a distinctly ad hoc
flavour. I am not at all satisfied with either of the approaches in
their present formulation, nor do I have any deep commitment as to which
is more likely to emerge as closer to the truth. This section is
accordingly meant only as a pointer towards future avenues of investigation into Maricopa—with some morals concerning the study of distributivity in general.

The first approach involves, basically, brute force tampering with the syntax of Maricopa, in order to make the semantics of -xper and ablaut conform to the analysis proposed in previous sections. Let us consider, for example, the constructions containing distributive conjoining verbs considered in section 8.4.1. As was shown, the problem with these constructions is that the distributive suffix -xper occurs within the NP distributed over, rather than within the VP that distributes. The syntactic approach, therefore, involves a reanalysis of the syntactic structure of conjunctions—as proposed in section 8.1.3, in order to assign the distributive conjoining verb to the VP that distributes, rather than—as per section 8.1.3—to the NP distributed over. The effect of such a move—with reference to some of the sentences discussed in section 8.4.1—is indicated in (58) below:

(58)

\[ S \]
\[ NP \]
\[ VP \]
\[ John-s Bill-s \]
\[ n'\text{i}d\text{o}sxperk \]
\[ ?ii \text{xmokm paay\text{\text{\text{\text{}}}sik} \]
\[ Naranks k\text{\text{\text{\text{}}}xtons\text{\text{\text{\text{}}}n'\text{i}d\text{o}sxperk \text{\text{\text{\text{}}}xmokm \text{\text{\text{\text{}}}................. \}
\[ Naranks k\text{\text{\text{\text{}}}xtons\text{\text{\text{\text{}}}xmokk \text{\text{\text{\text{}}}n'\text{i}d\text{o}sxperm \text{\text{\text{\text{}}}..... \}

To see how this works, consider the analysis of (35c) as represented in (58). In (58), the distributive conjoining verb \text{n'\text{i}d\text{o}sxperk} is detached...
from the conjoined NP John-š Bill-š, and is reassigned, instead, to the VP ?ii xmókm payašik to form a higher VP n'ibùuxperk ?ii xmókm payašik. Containing, as it now does, the distributive suffix -xper, this VP may now distribute over its head NP John-š Bill-š, in accordance with the analysis of -xper proposed in section 8.2. Similarly, in (40c) and (40d), the distributive conjoining verb n'īðoxperk or n'īðoxperm is attached to the VP xmókm or xmókk in order to form a higher VP which distributes over its head NP naranks k'xtonš. Thus, in (58), judiciously chosen syntactic structures offer a means of overcoming the problems presented by constructions involving distributive conjunctions, enabling the semantic analysis of -xper proposed in section 8.2 to be applied also to sentences such as those considered in section 8.4.1.

It is difficult to judge the plausibility of syntactic structures such as those indicated in (58) without a deeper knowledge of Maricopa grammar than I have at present at my disposal. Nevertheless, I am aware of the following line of argument which may be adopted in favour of such structures. Note that conjoining verbs in Maricopa exhibit rather peculiar linear ordering properties. Not only do they occur in a serial position that is unusual from a universal point of view, i.e. following the last conjunct (rather than between conjuncts), but, as indicated by (40b,d) and (43b,d), conjoining verbs may "float away", so to speak, from their conjuncts, occurring at what would appear to be an arbitrary distance from them. Thus, for example, in (40d) n'īðoxperm is removed from its NP naranks k'xtonš—the VP xmókk intervening between the two. Such behaviour clearly counterindicates the existence of a syntactic constituent containing the conjoining verb and its two

296
conjuncts. Instead, it lends prima facie support to a coordinate relationship—of the type posited in (58)—between the coordinating verb and its neighboring VP. 31

A number of other arguments, however, tend to cast doubt on the validity of the syntactic analysis presented above. To begin, note that the switch reference markers in (40c,d) support a hierarchical (rather than coordinate) arrangement of the two VPs in question. For example, in (40c), the different subject suffix -\text{m} on \text{xmok} indicates that the subject of \text{xmok} (\text{narak}s\text{\ }\text{k}\text{\ }\text{wxton}v) differs from that of the higher verb \text{yuuk} (the prefix ?-). However, the same subject suffix -\text{k} on \text{\nu}\text{\i}\text{\ou}\text{\us}\text{\perk} indicates that the subject of \text{\nu}\text{\i}\text{\ou}\text{\us}\text{\perk} (\text{narak}s\text{\ }\text{k}\text{\ }\text{wxton}v) is identical to that of its higher verb; therefore, its higher verb must be \text{xmokm} (with subject \text{narak}s\text{\ }\text{k}\text{\ }\text{wxton}v), not \text{yuuk} (with subject ?-). Thus, the type of coordinate structure represented in (58) provides no means of accounting for the different switch reference markers on the two coordinate VPs.

Perhaps a more fundamental objection against the syntactic approach lies in the overall semantic implausibility of structures such as (58). In general, one attempts to posit syntactic structures in such a way that each syntactic constituent is associated with a coherent semantic interpretation. For example, if the English translation of (35), John and Bill each carried three sticks, is parsed into NP and VP constituents, the resulting expressions, John and Bill and each carried three sticks, are both semantically coherent. It is less obvious, however, what the meaning of a putative VP \text{\nu}\text{\i}\text{\ou}\text{\us}\text{\perk} ?ii \text{xmokm paa}s\text{id}k is; the English translation and ... each carried three sticks brings
home some of the difficulties inherent to assigning such an expression a coherent semantic interpretation. 32

Finally, it is unclear how the analysis of distributive conjoining verbs represented in (58) may be extended to account for the problematic sentences involving distributive numerals discussed in section 8.4.2. The problem with the latter class of constructions is that there, the semantics is such that the suffix -xper (or the plural numeral) is unequivocally part of the expression distributed over--contra the analysis presented in sections 8.2 and 8.3. Consider, for example, sentence (46b)--?ipac' vumpapk xvikxperk ?ii xkomk upaavk. In (46b), there is simply no way of getting round the fact that each pair of men carried three sticks, that is, that the VP ?ii xkomk upaavk distributes over an NP containing -xper, namely, ?ipac' vumpapk xvikxperk. If, as per (58), xvikxperk is adjoined to ?ii xkomk upaavk, then the conjoined VP xvikxperk ?ii xkomk upaavk would distribute over the NP ?ipac' vumpapk, resulting in the incorrect semantics whereby each man (rather than each pair) carried three sticks.

The second, semantic approach to the problematic sentences discussed in sections 8.4.1 and 8.4.2 sidesteps all the syntactic difficulties considered above--leaving the syntax of these constructions as posited in section 8.1. Instead, the semantic approach involves an ad hoc postulate to the effect that for a certain class of constructions (the exact nature of which remains to be determined) the semantic effect of -xper and ablaut is, quite simply, the exact opposite of its usual semantic effect. While in most constructions, -xper and ablaut force a VP they occur in to distribute over its head NP, in a small exceptional
class, they work the other way, forcing an NP they occur in to be
distributed over by its sister VP.

As such, this is, of course, a non-solution—a mere restatement of
the facts. However, restating the facts in this way enables us to ob-
servе that what appears to be a peculiar property exhibited by a couple
of morphemes in an exotic language is perhaps not so peculiar at all:
in fact, it is a property shared by distributive markers in very many
languages—including English each. Consider, once again, the problem
posed by -xper:

(59) a. [John-š Bill-š nYioodum] ← [ʔii xmoqm paayxpersik] (cf. (35b))
    b. [John-š Bill-š nYiooduxpers] ← [ʔii xmoqm paayšik] (cf. (35c))

In both (59a) and (59b), the VP distributes over its NP head—even
though -xper occurs within the VP in (59a), but within the NP in (59b).
Remarkably, a parallel pattern is exhibited by English each:

(60) a. [Two men] ← [each carried three suitcases]
    b. [Each of two men] ← [carried three suitcases]

In both (60a) and (60b), the VP distributes over its NP head—even
though each occurs within the VP in (60a), but within the NP in (60b).
If it is any solace, then, the problem raised by -xper is thus one for
universal grammar, and not "just" one for Maricopa.

How similar are the two problems represented in (59) and (60)?
I have no adequate answer to such a question. One obvious point of
dissimilarity that comes to mind is the following. While English each
doubles as a universal quantifier, Maricopa -xper has no use (that I
am sure of) other than as a marker of distributivity. Presumably, a
logic for English should account for these two coexisting uses of each
--as universal quantifier and as marker of distributivity. However,
given that such a logic would, in so doing, also solve the problem posed
by English (60), the resulting analysis--whatever it may look like--
would be a natural candidate also for the parallel problem posed by
Maricopa (59). Thus, it would seem reasonable to hold in abeyance the
question of how best to analyze constructions such as (59) in Maricopa,
until a plausible solution to the problem posed by English (60) is made
available.

To conclude, we have explored two alternative approaches to the
problematical constructions involving -xper and ablaut in Maricopa,
without coming to any hard and fast conclusions. While a further evalu-
atation of the first syntactic approach presupposes a much deeper under-
standing of Maricopa grammar than I have at my disposal, the second
semantic approach would appear to be most appropriately pursued within
the framework of a more general investigation encompassing similar
phenomena in other languages. It should be emphasized, however, that
in the course of this chapter, we have succeeded in accounting for the
syntax and semantics of a large majority of the construction types con-
taining the suffix -xper or plural numerals in Maricopa--the construc-
tions considered in the present section constituting a relatively small
residue. More than in other languages, perhaps, our study of Maricopa
reveals the manifold ways in which the syntax and semantics of
distributivity may be inextricably intertwined with various language
particular grammatical systems.
Footnotes - Chapter 8

1 Maricopa is spoken on the Salt River and Gila River reservations in Arizona, USA, by approximately five hundred persons. Maricopa belongs to the Yuman family—which in turn is generally assigned to the Hokan phylum of languages. The most closely related languages to Maricopa are Yuma and Mojave.


The orthography used in this chapter differs in several respects from that in Gordon (1981), being, on the whole, much closer to standard IPA. The unvoiced dental stop is represented with t, and the unvoiced alveolar stop with t'. The symbol i represents a front high ephenthetic vowel with high pitch generally occurring in the environment of suffixes. Vowel length in several lexical items differs from that in Gordon (1981); the distinction between short and long vowels is often perceptually obscure—my policies in such cases has been to follow the vagaries of my own ear.

3 In many of the examples that follow, these two forms occur with the nominative case marking suffix -s, in which case they undergo certain morphophonemic adjustments: ?ipaa + s ?ipaś, ?ipas + s ?ipač.

4 In the remainder of this chapter, all of the numeral constructions cited involve verbal numerals. I am not aware of many arguments to the effect that one of the two types of numerals is more basic than the other—though I suspect that if one type is more basic, it is the verbal numeral type. Unfortunately, I also do not know whether non-verbal numerals in Maricopa may be marked for distributivity.

5 This generalization admits of a single exception— the non-final suffix -xt, after which the form of the realis marker is invariably -m.

6 In many of the examples cited in this chapter, the nominative case marker -s is omitted—thereby rendering subject NPs formally identical to -marked direct object NPs. Case marking in general in Maricopa is rather idiosyncratic, and subject to a certain degree of free variation. As in other similar cases, I have chosen to cite all examples as volunteered, without attempting to standardize whatever morphological irregularities may arise.
Various analyses of switch reference clauses are assumed for Maricopa by Gordon (1979, 1981), and for closely related Mojave by Munro (1976, 1977, 1979). However, these analyses are not extensively defended against possible alternative analyses.

In tree diagrams (11) and (13)—but not (12)—we have assumed that in a transitive clause consisting of subject, object, and verb, the object and verb form a VP constituent to the exclusion of the subject. This assumption is irrelevant to the distinction between the three different approaches to switch reference clauses; alternative trees could have been provided illustrating the approaches of (11) and (13) without a VP constituent. However, as we shall argue in section 8.2.2, the semantics of the verbal suffix -xper provides evidence in favour of the existence of a VP in Maricopa.

The type of construction chosen to translate English conjunctions is dependent on a number of different factors, primarily the semantic features of the conjoined nouns. We shall not be concerned with these factors here.

(This footnote added by typist.) Note that there are two each of examples (13) and (14). Due to a combination of the complexity of what follows, the unavailability of the author, and a looming deadline, there was no attempt made to correct the example numbering. I do not think it will create a problem as long as you are aware of the fact of the existence of the number duplication.

The probably lack of conjunctions in Maricopa clearly sheds serious doubts on the universality of the propositional calculus, and the logical connectives therein; recall Mauthner's claim, cited in section 1.1, that Aristotelian logic is nothing but a reformulation of Greek grammatical patterns. That this property of Maricopa may have non-linguistic cognitive correlates is supported by a truly extraordinary fact reported by Langdon (1970). In her grammar of Diegueno—a Yuman language related to Maricopa—she writes (p. 172) that "informants typically are uncomfortable when asked to translate English sentences with conjoined nouns". This is an area crying out for serious investigation.

Examples from other languages can be adduced in which the juxtaposition of expressions may be interpreted either as a conjunction or as a disjunction. Consider the following two examples of discourse in English:

(i) Speaker A: Which three electives would you like to register for next semester?
Speaker B: Aristotelian Logic, Government and Binding, Maricopa Grammar.
(ii) Speaker A: Which elective would you like to register for next semester?

Speaker B: Aristotelian Logic, Government and Binding, Maricopa Grammar (...I really don't care which).

Although formally identical (except, perhaps, for intonation), speaker B's response is a conjunction in (i) but a disjunction in (ii). The crucial difference between English and Maricopa is that English has at its disposal an and and an or, whereas Maricopa has not.

12 We leave open the question of whether this relation of containment is syntactic, definable in terms of dominance, or semantic, definable in terms of entailment.

13 Remaining unaccounted for is the presence of the plural object proclitic n^i- on ñuu in (16) vs. its absence in simple clauses in (19) and (21). Like many other examples of Maricopa morphology—cf. case marking in footnote 6—the distribution of n^i- is rather erratic; thus, for example, it does not occur where it might have been expected to in (1c,f), (9a), and elsewhere. In some cases that I have elicited, its presence or absence are in free variation; however, it would appear to be obligatory with ñuu when used as a conjoining verb.

14 In general, I have no evidence for the existence of phrasal distributivity induced by -xper in Maricopa; presumably, this would involve suffixation of -xper to a non-verbal modifier, such as those exemplified in (1b,c). As pointed out in footnote 4, I do not know whether such constructions are permitted.

15 The reader may have wondered why the Maricopa sentences in (1) and (2) chapter 2 involve sticks, rather than suitcases—like all the other sentences. The reason is that Maricopa has a number of distinct verbs of carrying, the choice of which is governed by the shape and perhaps other properties of the object being carried. When I tried to elicit translations for Two men carried three suitcases each, I found (after much confusion and bewilderment) that the suitcases in my mimeographed kit of men-carrying-suitcases drawings fell right in the middle of a nether-nether land between round objects, for which the verb a?ul^/ is appropriate, and long objects, for which pää is appropriate. Hence, I switched to sticks, indubitably long.

16 Gordon (1981:133) suggests an alternative analysis of -xper that would appear to do away with the necessity of positing a VP constituent; her proposal is that -xper forces the verb containing it to distribute over its subject NP. On universal grounds, her analysis is certainly well motivated; as we have seen repeatedly throughout the course of this dissertation (e.g. sections 4.3, 5.1.2, 7.4.1) the syntax and semantics of distributivity is frequently governed by a grammatical relations hierarchy. However, in the case at hand, it is hard to see how an account based on grammatical relations can force the direct object NP in (26b) to distribute along with the verb over the subject NP (as
is necessary in order to get the semantics right)—without essentially asserting that the verb and direct object form a constituent.

17 It follows from the above analysis that neither (26a) nor (26b) have class B interpretations. I have encountered no clear-cut instances of distributivity over events in Maricopa, though this may be due to not searching hard enough. (At the time I had access to a speaker of Maricopa, I was not attuned to the distinction between distributivity over events and phrase-internal distributivity—e.g. classes B and C of interpretations of sentences such as (26).)

I would predict, however, that distributivity over events could be forced by a distributive numeral qualifying a verb, as in the following:

(i) *Avvarm xmoxxpkerk* (cf. (22b) chapter 3)

3-sang-sg-ds 3-three-sg-dist-real

Unfortunately, I have not had occasion to examine such constructions.

18 Although Langdon and Munro (1980) list Maricopa numerals from one to ten, the speaker I had access to could recall only the forms listed in (28). However, for every form she could recall, she was able to provide both singular and plural forms.

19 In general, distributive plural numerals are, once again, synonymous to their distributive singular and non-distributive counterparts. However, I have elicited one example of non-synonymity between a distributive singular numeral—*sentxperk* in (i/a), and a distributive plural numeral—*siiintxperk* in (i/b):

(i) a. Naranx kxntxos y sentxperk

orange-nom banana-nom 3-one-sg-dist-real

"One orange and one banana"

b. Naranx kxntxos y siiintxperk

orange-nom banana-nom 3-one-pl-dist-real

"Sets of one orange and sets of one banana"

From the above example, it would appear to be the case that in construction with conjunctions, distributive singular numerals distribute externally (like, also, xmoxxpkerk in Maricopa sentence (36f) section 5.1.3), whereas distributive plural numerals distribute internally (like Georgian sam-sam in (36c), same section). Unfortunately, I have no further data to corroborate this claim.

20 In general, synonymy is not a sufficient condition for the characterization of two constructions types as belonging to a single type. For example, although (i/a) and (i/b) below are synonymous, only (i/b) is an instance of a reciprocal construction:

(i) a. John hit Bill and Bill hit John

b. John and Bill hit each other
21. What such a non-distributive analysis of plural numerals might look like we shall not attempt to answer here. Presumably, however, it would capture the synonymy of xmuukk and xmkxperk, just as any semantics of reciprocal constructions in English is obliged to account for the synonymy of non-reciprocal (i/a) and reciprocal (i/b) in footnote 20 above.

Note that such an analysis is, most probably, required in any case, to account for the semantics of the following English paraphrases of Maricopa (32a) and (32b-d):

(i) a. The boys form one set of three
b. The boys form several sets of three
(paraphrase of (32c))
(paraphrase of (32b-d))

While the distinction between (32a) with xmokk and, at least, (32b) with xmkxperk clearly involves a relation of distributivity, the distinction between their English paraphrases does not—resting instead on the singular vs. plural form of the noun set.

22. Numerals with plural markings are attested in other languages—e.g. English in threes, Georgian sameulebi—cf. footnote 14 chapter 7. These cases differ from Maricopa in that the plural marker—s in English, -eb in Georgian—is nominal, whereas that of Maricopa is verbal. Nevertheless, in accordance with the Unified Analysis Principle formulated in chapter 1, the results of the present analysis of plural numerals in Maricopa is of relevance to any analysis to be proposed for numerals with plural markings in other languages, e.g. English and Georgian. In particular, the distributive nature of plural numerals in Maricopa—as argued for in this section and the next one—may be construed as providing support for the distributive nature of in threes and sameulebi. The use of plural markings to form distributive numerals is discussed from a universal point of view in section 9.2.

23. In accordance with our analysis of conjunctions such as doctors and lawyers in section 4.2.4 and our analysis of -xper in section 8.2, we might predict John’s Bill-s n’idiouxpemr to have the somewhat contradictory meaning "individuals who are each (both) John and Bill". (This would correspond to the "doctor-lawyer" interpretation of doctors and lawyers, as opposed to the "some doctors and some lawyers" interpretation.) However, in the case at hand, John’s Bill-s n’idiouxpemr does not mean this, referring instead to a set of two individuals, one John, the other Bill. Unfortunately, I have not had occasion to examine how distributive conjoining verbs such as n’idiouxpemr affect the semantics of coordinate structures corresponding to English doctors and lawyers, where both classes of interpretations are potentially available.

24. Even more bizarre, perhaps, is a corresponding paradigm for conjunctions of verbs, rather than nouns. Verbs, like nouns, may be conjoined by means of the conjoining verb ınuu "be", though what the structure of such conjunctions is I would not wish to hazard a guess. Following are some of the sentences I succeeded in eliciting as a
description of a picture portraying three red flowers and three blue flowers; the reader may observe the existence of analogous problems to those in (40) and (43):

(i) a. ?ayoutav  n'}i'umu
    x'moxperk x'av'suuk x'av'suuk
    flower-nom 3-three-sg-dist-ss 3-red-pl-ss 3-blue-pl-ss
    n'}i'umu
    pl:obj-3-be-sg-real

b. ?ayoutav  n'}i'umu
    x'v'aat'v'k x'av'suuk x'moxperk
    flower-nom 3-red-pl-ss 3-blue-pl-ss 3-three-sg-dist-ss
    n'}i'umu
    pl:obj-3-be-sg-real

c. ?ayoutav  n'}i'umu
    x'v'aat'v'k x'av'suuk x'moxperk
    flower-nom 3-red-pl-ss 3-blue-pl-ss pl:obj-3-be-sg-real
    x'moxperk (=46c) chapter 5
    3-three-sg-dist-ss

d. ?ayoutav  n'}i'umu
    x'v'aat'v'k x'av'suuk x'moxk
    flower-nom 3-red-pl-ss 3-blue-pl-ss 3-three-sg-sg
    x'moxperk
    pl:obj-3-be-sg-dist-ss

"The flowers number three red ones and three blue ones"

We shall not consider these sentences any further in this dissertation.

25 What the interpretation of (50) is I have, unfortunately, been unable to ascertain—due, at least in part, to its low degree of grammaticality.

The juxtaposition of (46b) and (50) raises the question why (46b) is not bad for the same reason as (50)—namely, the occurrence of a distributive numeral in subject position. This is another of the many questions in this chapter for which I have no answer.

26 The use of a distributive numeral "one-dist"—as in (54b,c)—to mark clausal distributivity, like the adverbial markers each, French chacun, Georgian tito, etc. discussed in section 4.1.2, is attested in other languages, for example:

(i) a. Dongolese Nubian
    Wév'g garis döoci tikkori
    one-dist piaster five-acc give-perf-lsg
    "I gave (them) five piastres each"

b. Buginese
    Dua tau nabicag tellu beg ta?sedisedina (=2b) chapter 2
    two man carry three suitcase dist-one-poss
    "Two men carried three suitcases each"

(Neither Edmondson 1980 nor I elicited any Buginese distributive numerals in more usual environments; however, according to Sirk 1975:65,'
forms such as ta?sedisedina are distributive numerals. Possibly, for the speakers I had access to, ta?sedisedina is no longer synchronically analyzable as a distributive numeral, but only diachronically so.)

In spite of the rather obvious syntactic differences between the distributive numeral forms in (1/a), (1/b), and (54b,c), the similar use of "one-dist" in Nubian, Buginese, and Maricopa provides some indication that the problems presented by šiintik and other distributive forms under discussion in this section do not represent a quirk of Maricopa, but, rather, one particular instance of a more cross-linguistically widespread phenomenon.

The equivalence between each and ʃiintik, and the parallel between (54b) with ʃiint "3-one-pl" and (51) with xvaak "3-two-pl" suggest that in other languages, the marker of distributivity corresponding to each may be the first of an ascending series of markers of distributivity—as is the case for šiint, xvaak, xmuuk etc. in Maricopa. Likely candidates are those languages—exemplified in (59), (60), (62) section 4.3.2.2—where the marker of distributivity contains, inter alia, the numeral "one".

In fact, for at least one language that I am aware of, this is the case. In Hebrew, the equivalent of adverbial each—kol ə导航 "every one-m", is the first member of a series continuing kol ə negligent "every two-m", kol ə negligent "every three-m", etc. As a result, Maricopa sentences (46b) and (51) are much more easily translatable into Hebrew than they are—cf. (47)—into English:

(i) Arbaʃa anəsim nasʔu ʃaʃa maklot kol ə negligent four-m men carried-3pl three-f sticks every two-m

27 The relativized form k ʃiintik in (54c) is in fact volunteered more frequently than the non-relativized form ʃiintik. It should also be noted that the distributive numeral ʃentxperk "3-one-sg-dist-ss" was judged to be ungrammatical in place of ʃiintik or k ʃiintik in (54), this being the only case I have elicited of difference cooccurrence restrictions on corresponding numerals marked with ablaut and with -xper. I have no explanation for this fact, other than to speculate that the plural forms ʃiintik and k ʃiintik may be undergoing reanalysis as adverbial forms (cf. comments on Buginese ta?sedisedina in footnote 26)—thereby perhaps accounting for the different syntactic behaviour than its counterpart ʃentxperk.

28 Again—cf. footnote 25—I have no explanation as to why ʃiintik is acceptable within a subject NP in (56)—but not in (50). Perhaps in (56) ʃiintik is undergoing reanalysis as a universal quantifier.

29 In actual fact, the analysis of -xper proposed in section 8.2 requires a trivial modification in order to apply correctly to (35c) in (58). In (35c), it is not the lowest VP node dominating -xper that distributes over its head, but, rather, a higher VP. Recall that the reason for specifying that the lowest VP node dominating -xper is the
one that distributes is to prevent the higher VP pii xmokxperm paavyík from distributing over pípáaz xwik in (26a). In (26a), however, the lower VP xmokxperm is separated from the higher VP pii xmokxperm paavyík by NP and S nodes. In order to allow n’idúuxperm pii xmokm paavyík to distribute in (35c) while at the same time preventing pii xmokxperm paavyík from distributing in (26a), we may appeal to this syntactic difference, in stipulating, say, that a VP dominating -xper may distribute over its head if there is no intervening NP or S node.

30 Unfortunately, I have not yet been able to investigate the phenomenon of "floating conjunctions" any more systematically--so my knowledge of it is essentially restricted to the examples cited in this dissertation. In particular, I do not know if n’idúuxperm in (35c) may float, like its counterparts in (40) and (43).

31 In fact, n’idúuxperm and pii xmokm paavyík in (38) may perhaps most appropriately be considered as conjoined VPs, much like the following sentence, also instantiating (58):

(i) ?avúta ?a’at’?k xavúuxk
flower-nom 3-red-pl-real 3-blue-pl-real

Floating conjoining verbs would thus result from the two VP conjuncts commuting, as is very natural. Though, I must admit, it requires considerable mental gymnastics to envisage a conjunction one of whose conjuncts is, itself, a conjunction.

32 It is with a certain amount of trepidation that I advance this argument against the analysis represented in (58). In spite of its appeal, I am not sure whether the notion of "semantically coherent constituent" is, itself, coherent. In particular, I feel that any attempt to judge the semantic coherence of a constituent such as Maricopa n’idúuxperm pii xmokm paavyík is bound to run up against the biases and prejudices of an English speaking linguist brought up on the standard logician's fare of propositional connectives.

33 Certain other differences between English each and Maricopa -xper will, of course, have to be accommodated by such an analysis. Thus, for example, with respect to English each, it is possible to predict by the morphology and syntax of the construction whether each forces a constituent containing it to be distributed over, or to distribute over some other constituent. To wit, if each occurs prenominally---e.g. as in (60b)---it forces the NP containing it to be distributed over; otherwise---e.g. as in (60a)---it forces an NP or a VP containing it to distribute over some other constituent. No analogous generalization is available for Maricopa -xper---occurring in an identical construction, namely, as a non-final verbal suffix, in both cases. Conversely, it would appear as though the interpretation of -xper---but not each---is governed, at least in part, by lexical factors, the problematical interpretations of -xper being associated with conjoining verbs and numerals.
Several interesting topics involving quantification and
distributivity in Maricopa have been omitted, or, at best, touched
upon in the course of this chapter; these include numerals qualifying
verbs, frequentative verbs, other non-final verbal suffixes—in
particular t and nt, verbal vs. adjectival numerals, and strategies for
expressing disjunction. Each of these topics is worthy of much further
study; to do so, however, presupposes a much better overall understand-
ing of the grammatical patterns of Maricopa than I have at present.
Chapter 9

9. Linguistic Universals Governing Distributive Numerals

In the course of this dissertation, we have adopted two different approaches towards the study of distributive numerals. In chapters 2-5, the approach was universally oriented, seeking out what is common to distributive numerals in all languages, as the basis for a general semantic analysis of distributive numerals. In chapters 6-8, emphasis shifted in the direction of a relativistically oriented approach, applying the analysis of distributive numerals to various language-specific constructions, with an eye towards assessing the place of distributive numerals within broader grammatical systems in each language. Throughout the dissertation, our goal was, in the words of Cassirer "to formulate the questions asked of linguistics with systematic universality, but in each case to derive the answers from actual empirical inquiry (cf. footnote 2 chapter 1).

In this chapter, an attempt is made to provide a synthesis of universal and relativistic approaches towards the study of distributive numerals. This synthesis takes the form of 22 linguistic universals governing the morphology, syntax, and semantics of distributive numerals. Of these 22, 13 are implicational universals, thereby capturing patterns of cross-linguistic variation within generalizations of universal validity. To use Humboldt's terms, these universals accordingly represent both the "midpoint around which all languages revolve" and the "grammatical properties...inextricably woven into the individuality of their language" (cf. footnote 2 chapter 1).
These 22 linguistic universals are all offered very tentatively; perhaps "conjectures" would have been a better name for them. Many of the generalizations—particularly the semantic ones—are based solely on my own elicitations from about five or ten different languages, and as such, clearly require much further empirical investigation before they may be taken to be adequately supported. It is to be hoped that this chapter will serve to point out some of the directions in which such empirical investigation might be most profitable.

The ultimate aim of this chapter, however, is to provide a contribution towards an adequate empirical foundation for a theory of quantification in natural language. Its goal will have been achieved, if the generalizations proposed herein (or whatever future versions thereof are established as most veracious) are recognized as constituting a body of facts for which any would be empirically adequate theory of natural language quantification is obliged to provide a satisfactory account.

9.1 Cross-Linguistic Distribution of Distributive Expressions

Languages differ in their inventory of distributive numerals. Tagalog, for example, is much richer in distributive numerals than is English. Moreover, as we saw in chapters 6–8, distributive numerals may often constitute subclasses of broader categories of distributive expressions—again differing from language to language. Thus, for example, Tagalog has a very restricted class of distributive nouns, Georgian has productive classes of distributive adjectives and adverbs and a restrictive class of distributive verbs, while Maricopa has a productive class of distributive verbs. In this section, we shall formulate a number of universals governing the cross-linguistic
distribution of distributive numerals, and of distributive expressions in general.

First, an apparently exceptionless generalization:

(1) **Universal 1**

All languages have distributive numerals of the following series:

a. adverbial distributive numerals qualifying nouns;

b. increasing non-decreasing, non-increasing decreasing, non-increasing non-decreasing, and restrictive distributive numerals.

Universal 1 may be illustrated with English:\(^1\)

(2) a. **ADVERBAL DISTRIBUTIVE NUMERALS QUALIFYING NOUNS** in threes

b. **INCREASING NON-DECREASING DISTRIBUTIVE NUMERALS** at least in threes

**NON-INCREASING DECREASING DISTRIBUTIVE NUMERALS** at most in threes

**NON-INCREASING NON-DECREASING DISTRIBUTIVE NUMERALS** exactly in threes

**RESTRICTIVE DISTRIBUTIVE NUMERALS** only in threes

As we saw for Tagalog and Maricopa, some of these series may be formed by morphological rather than syntactic strategies, resulting in one-word rather than phrasal forms. We shall consider these various strategies in detail in section 9.2.

Universal 1 defines a core of distributive expressions common to all languages; all other types of distributive expressions occur in some but not all languages. Of the non-universal distributive expressions, the most widespread types are the ordinary adnominal distributive
numerals and the ordinary distributive numerals qualifying verbs. This fact is reflected by Universals 2-6.

(3) **Universal 2**

If a language has ordinary distributive numerals qualifying verbs, it has ordinary adnominal distributive numerals, and vice versa. Universal 2 stipulates that ordinary adnominal distributive numerals and ordinary distributive numerals qualifying verbs are coextensive. Universal 2 thus allows for two types of languages—those with both series of languages—as in (4a), and those with neither—as in (4b):

(4)

<table>
<thead>
<tr>
<th>ORDINARY ADNOMINAL DISTRIBUTIVE NUMERALS</th>
<th>ORDINARY DISTRIBUTIVE NUMERALS QUALIFYING VERBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;three&quot;</td>
<td>&quot;three&quot;</td>
</tr>
<tr>
<td>a. Tagalog</td>
<td>tigtatlo</td>
</tr>
<tr>
<td>Georgian</td>
<td>sam-sami</td>
</tr>
<tr>
<td>Maricopa</td>
<td>xmokxperk</td>
</tr>
<tr>
<td>b. English</td>
<td>---</td>
</tr>
<tr>
<td>Hebrew</td>
<td>---</td>
</tr>
</tbody>
</table>

Languages with ordinary adnominal distributive numerals and ordinary distributive numerals qualifying verbs may, in addition, have other types of distributive expressions.

(5) **Universal 3**

If a language has ordinal distributive numerals, it has ordinary adnominal distributive numerals.

Ordinal numerals are, in general, adnominal. Universal 3 stipulates that ordinal distributive numerals are rarer than their ordinary adnominal counterparts. Thus, some languages—e.g. those in (6a), have both distributive numeral series, others—e.g. those in (6b), have only ordinary adnominal distributive numerals, while yet others—e.g. those
in (6c), have neither series. Universal 3 stipulates the non-existence of a fourth type of language, with ordinal distributive numerals but no ordinary adnominal distributive numerals: ³

<table>
<thead>
<tr>
<th></th>
<th>ORDINARY ADNOMINAL DISTRIBUTIVE NUMERALS</th>
<th>ORDINAL DISTRIBUTIVE NUMERALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;three&quot;</td>
<td></td>
<td>&quot;three&quot;</td>
</tr>
<tr>
<td>a. Tagalog</td>
<td>tigtatlo</td>
<td>ikaikatlo</td>
</tr>
<tr>
<td></td>
<td>Fox</td>
<td>nânesw³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>nânesônameg³</td>
</tr>
<tr>
<td>b. Georgian</td>
<td>sam-sami</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Latin</td>
<td>terni</td>
</tr>
<tr>
<td></td>
<td>Russian</td>
<td>po tri</td>
</tr>
<tr>
<td>c. English</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Hebrew</td>
<td>---</td>
</tr>
</tbody>
</table>

Non-numerical distributive expressions are, in general, rarer than their numerical counterparts:

(7) **Universal 4**

If a language has distributive non-numerical quantifier expressions, it has ordinary adnominal distributive numerals.

Again, Universal 4 defines three types of languages: those with both types of expressions---(8a), those with only ordinary adnominal distributive numerals---(8b), and those with neither type of expression---(8c); a fourth type of language that with distributive non-numerical quantifier expressions but no ordinary adnominal distributive numerals is ruled out: ⁴
(8)  

<table>
<thead>
<tr>
<th></th>
<th>ORDINARY ADNOMINAL DISTRIBUTIVE NUMERALS</th>
<th>DISTRIBUTIVE NON-NUMERICAL QUANTIFIER EXPRESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Georgian</td>
<td>sam-sami</td>
<td>bevr-bevri</td>
</tr>
<tr>
<td>Maricopa</td>
<td>xmokxperk</td>
<td>paľxperk</td>
</tr>
<tr>
<td>Russian</td>
<td>po tri</td>
<td>po mnogu</td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tagalog</td>
<td>tigtatlo</td>
<td>---</td>
</tr>
<tr>
<td>Turkish</td>
<td>uçer</td>
<td>---</td>
</tr>
<tr>
<td>Bura</td>
<td>máámákèr</td>
<td>---</td>
</tr>
<tr>
<td>Latin</td>
<td>terni</td>
<td>---</td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Hebrew</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Closely related to the above are distributive interrogative quantifiers:

(9) **Universal 5**

If a language has distributive interrogative quantifier expressions, it has ordinary adnominal distributive numerals.

Most languages with ordinary adnominal distributive numerals also have distributive interrogative quantifiers—cf. (10a); Maricopa is the only language I am aware of with ordinary adnominal distributive numerals but no distributive interrogative quantifiers—cf. (10b). Other languages—cf. (10c)—have neither type of expressions, but no languages have distributive interrogative quantifier expressions but no adnominal distributive numerals:
(10)  

<table>
<thead>
<tr>
<th>Ordinal Adnominal Numerals</th>
<th>Distributive Interrogative Quantifier Expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;three&quot;</td>
<td>&quot;how many&quot;</td>
</tr>
<tr>
<td>a. Tagalog</td>
<td>tigtatlo</td>
</tr>
<tr>
<td>Georgian</td>
<td>sam-sami</td>
</tr>
<tr>
<td>Turkish</td>
<td>üçer</td>
</tr>
<tr>
<td>Latin</td>
<td>terni</td>
</tr>
<tr>
<td>Russian</td>
<td>po tri</td>
</tr>
<tr>
<td>Bura</td>
<td>màamàakàr</td>
</tr>
<tr>
<td>Maricopa</td>
<td>xmokxperk</td>
</tr>
<tr>
<td>h. Maricopa</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
<tr>
<td>Hebrew</td>
<td></td>
</tr>
</tbody>
</table>

The last universal in the present series pertains to the broader categories of distributive adjectives and verbs:

(11) **Universal 6**

If a language has distributive non-quantifying adnominal expressions, it has ordinary adnominal distributive numerals.

Universal 6 also allows for three types of languages: those with both ordinary adnominal distributive numerals and distributive non-quantifying adnominal expressions—e.g. (12a), those with ordinary adnominal distributive numerals but no distributive non-quantifying adnominal expressions—e.g. (12b), and those with neither of the two classes of expressions—e.g. (12c). No language, it is predicted by Universal 6, may have distributive non-quantifying adnominal expressions but no ordinary adnominal distributive numerals:
(12) | ORDINARY ADNOMINAL DISTRIBUTIVE NUMERALS | DISTRIBUTIVE NON-QUANTIFYING ADNOMINAL EXPRESSIONS |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;three&quot;</td>
<td>&quot;good&quot;</td>
</tr>
</tbody>
</table>

a. **Georgian** sam-sami                   
   **Maricopa** xmokxperk                   

b. **Tagalog** tigtatlo                   
   **Turkish** üçer                        
   **Latin** termi                        
   **Russian** po tri                       

c. **English**                            
   **Hebrew**                              

Universals 1-6 above support the following hierarchy governing the distribution of distributive expressions across the world's languages:

(13) | adverbial distributive numerals qualifying nouns |
-----------------------------------------------|

<table>
<thead>
<tr>
<th>ordinary adnomin</th>
<th>ordinary distributive numerals qualifying verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>distributive numerals &amp; | distributive non-numerical quantifier expressions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>distributor non-quantifying adnomin expressions</td>
</tr>
</tbody>
</table>

That is to say, if a language has a certain type of expression in (13), it has every type of expression that is located higher up on the hierarchy. However, within the set of four items at the bottom of the hierarchy, no universally valid arrangement would seem possible. Thus,
for example, Georgian has every item except for ordinal distributive numerals, while Maricopa has every item except for distributive interrogative quantifier expressions—thereby indicating that the inventories of distributive expressions of these two languages are partially independent of each other.

The most salient property of hierarchy (l3) is the dominant position occupied by various series of distributive numerals. Hierarchy (l3) thus attests to the fact that numerals constitute the class of expressions that is most likely to be marked for distributivity. In other words, every language has distributive numerals; some but not all languages may also mark non-numerical expressions for distributivity. This is, of course, the main reason why distributive numerals provide a convenient springboard for the study of distributivity in general.

Although governing the cross-linguistic distribution of distributive expressions, Universals l-6 make no predictions as to where specific languages stand with respect to the hierarchy in (l3). Let us consider, for example, English and Georgian. Both of these languages uphold each of the six universals formulated in the previous pages; however, they do so in very different ways. Is it by sheer accident that English has only adverbial distributive numerals qualifying nouns, whereas Georgian has, in addition, ordinary adnominal distributive numerals, ordinary distributive numerals qualifying verbs, distributive non-numerical quantifier expressions, distributive interrogative quantifier expressions, and distributive non-quantifying adnominal expressions? We shall return to this question in section 9.4, in order to suggest that the various possible inventories of distributive expressions are not
distributed randomly across the world's languages, but, instead, correlate with other syntactic and semantic properties—in particular, the degree to which various languages distinguish between syntactic categories of common and determined noun phrases.

9.2 **Morphosyntactic Universals**

Having considered the place of distributive numerals among distributive expressions in general, we shall now examine in more detail various universals governing the form and meaning of distributive numerals, beginning—in the present section—with the question: what do distributive numerals look like?

(14) **Universal 7**

Distributive Numerals are formed by application of morphosyntactic strategies to the corresponding cardinal numerals.

Universal 7 reflects the composite nature of distributive numerals (cf. section 2.4)—consisting of a numeral base plus a morphosyntactic marker of distributivity. Universal 7 no doubt constitutes one particular instance of a more general universal whereby non-cardinal numerals (of any series) are formed from the corresponding cardinal numerals.

The strategies used to form distributive numerals may be morphological—e.g. Turkish üçer "three-dist" from üç "three", syntactic—e.g. Russian po tri "dist three" from tri "three", or a combination of the two—e.g. English in threes from three. Although any morphosyntactic strategy available in a language is a potential candidate for the formation of distributive numerals, two particular strategies are used with greater than chance frequency across the world's languages; these are
reduplication and pluralization. (Since one of these two strategies—
reduplication—is defined formally and the other strategy is defined in
terms of its meaning—pluralization, these two strategies are not logic-
ally independent—and, in fact, they may overlap.) The reader will most
certainly have noticed the large number of examples of distributive
numerals formed by means of reduplication. In Tagalog, for example,
adnominal distributive numerals of series 2 and 3 are formed by initial
reduplication in conjunction with prefixation—e.g. tigtatatlo,
tiga-tigatlo "dist-three", while adverbial distributive numerals are
formed by total reduplication—e.g. tatlu-tatlo "dist-three". In
Georgian, reduplication constitutes the only strategy for the formation
of a wide variety of distributive expressions, e.g. sam-sami "three-dist-
nom", k'arg-k'argi "good-dist-nom", mic'i-mic'ia "moved-ph:dist-3sg".
In Maricopa we encountered no obvious instances of reduplication,
though the obligatory vowel lengthening accompanying ablaut in the for-
mation of plural distributive numerals—e.g. xmuukk "3-three-pl-real",
may perhaps be considered as a degenerate instance of reduplication.
Following are some additional examples of distributive numerals formed
by reduplication:

(15) a. Vietnamese

   ba ————> ba ba      "three"

(Thompson 1965:151)

b. Tamil

   mūngū ————> mūmmūngū  "three"

(Andronov 1966:82)

c. Nepali

   tin ————> tinnin   "three"

(Xorolev 1965:55)

320
d. Tabasaran  
\[ \text{\textcircled{su}ubub} \rightarrow \text{\textcircled{su}ubub} \quad \text{"three"} \]  
(Xanmagomedov 1967:551-552)

e. Fula  
\[ \text{go?o} \rightarrow \text{go?o go?o} \quad \text{"one"} \]  
(Arnott 1970:172-173)

f. Mergi  
\[ \text{\textcircled{f}od\textcircled{u}} \rightarrow \text{\textcircled{f}od\textcircled{u}} \quad \text{"four"} \]  
(C. Hoffmann 1963:111)

g. Malagasy  
\[ \text{telo} \rightarrow \text{tsitelotelo} \quad \text{"three"} \]

h. Fox  
\[ \text{neswi} \rightarrow \text{n\textacute{a}neswi} \quad \text{"three"} \]  
(Jones 1911:863-865)

i. Kwakiutl  
\[ \text{mo} \rightarrow \text{m\textacute{a}mo} \quad \text{"four"} \]  
(Boas 1947:276)

k. Pima  
\[ \text{hemako} \rightarrow \text{hehemako} \]

Other examples cited in this dissertation of distributive numerals formed by reduplication come from Gidabal, Mandarin Chinese, Pampangan, Pangasinan, Indonesian, Mundari, Burushaski, Hindi, Rumanian, Swedish, Turkish, Circassian, Hebrew, Bura, Hausa, Nubian, Yoruba, and, of course, English three by three. Finally, mention should be made of distributive numerals in Ga, formed by reduplication, or, optionally, retriplication:

(16) Ga  
\[ \text{et\textasciitilde{\textperiodcentered}f} \rightarrow \text{et\textasciitilde{\textperiodcentered}t\textasciitilde{\textperiodcentered}t\textasciitilde{\textperiodcentered}f} \rightarrow \text{et\textasciitilde{\textperiodcentered}t\textasciitilde{\textperiodcentered}t\textasciitilde{\textperiodcentered}t\textasciitilde{\textperiodcentered}f} \quad \text{"three"} \]

The widespread use of reduplication to form distributive numerals may, at least in part, be captured by the following statement:
(17) **Universal 8**

If a language forms a non-cardinal numeral series by means of reduplication, it forms distributive numerals by means of reduplication.

Universal 8 allows for three types of languages: those using reduplication to form distributive numerals and other numeral series, those using reduplication only to form distributive numerals, and those not using reduplication to form any non-cardinal numeral series. These two types are represented in (18a–c) respectively (all the numerals are glossed as "three"):

(18)

<table>
<thead>
<tr>
<th>CARDINAL NUMERAL</th>
<th>DISTRIBUTIVE NUMERAL</th>
<th>OTHER NON-CARDINAL NUMERAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Pangasinan</td>
<td>talo</td>
<td>santatatlo</td>
</tr>
<tr>
<td>(Blake 1907)</td>
<td></td>
<td>taltalo</td>
</tr>
<tr>
<td></td>
<td>(restrictive)</td>
<td></td>
</tr>
<tr>
<td>b. Hebrew</td>
<td>šloša</td>
<td>šloša šloša</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Russian</td>
<td>tri</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Universal 8 asserts that no language will use reduplication to form a non-distributive non-cardinal numeral series, while not making use of reduplication to form distributive numerals.

The widespread use of reduplication to form distributive numerals is—quite clearly—iconically motivated. That is to say, the repetition of a sequence of sounds corresponds to the repetition of a certain referent, typically, a set of so many objects. Of course, repetition per se does not necessarily entail distributivity, but, only, plurality. Indeed, in many languages, reduplication is used to mark simply plurality, without any necessary distributive meaning—e.g. Indonesian anak "child", anak-anak "children".
However, as noted previously—e.g. section 8.3—distributivity and plurality are closely related notions. It is thus not surprising to find that in several languages, the morphosyntactic strategy used to form distributive numerals is identical to that used to form plurals—of whatever category the numerals belong to. Thus, for example, Georgian forms distributive nominal numerals with its nominal plural suffix -eb—e.g. sameulebi "three-nml-pl-nom"; other similar examples include Hebrew bislašot "in-three-nml-plf" and English in threes. Note that while reduplication is a formal characteristic of morphosyntactic strategies, plural is a meaning characteristic. In view of the fact that reduplication is often used to mark plurality, it is to be expected that in some cases, distributive numerals are formed by a morphosyntactic strategy involving reduplication and denoting plurality. Such, arguably, is the case for Maricopa xmuukk "3-three-pl-real" mentioned above, where pluralization is marked, inter alia, by vowel lengthening. A more clear cut example is offered by Indonesian bertigatiga "nml-three-pl", formed—like plural nouns in Indonesian—by total reduplication of the stem tiga "three".

The widespread use of pluralization to form distributive numerals may be captured, in analogy to reduplication, in the following universal:

(19) Universal 9

If a language forms a non-cardinal numeral series by means of pluralization, it forms distributive numerals by means of pluralization.

Again, Universal 9 defines three types of languages. I am aware of no examples of languages of the first type, in which distributive numerals and other non-cardinal numerals are formed by pluralization. The second
type of language, that where distributive numerals but no other non-cardinal numerals are formed by pluralization, is exemplified by Georgian, Hebrew, and the other languages mentioned above. The third type of language, in which no non-cardinal numerals are formed by pluralization, is exemplified by Russian and Turkish. Universal 9 predicts that no language will use pluralization to form a non-distributive non-cardinal numeral series, while making use of some other morphosyntactic strategy to form distributive numerals.

Universals 7-9 concern the forms of distributive numerals in general, making no reference to particular types of distributive numerals. The next two universals govern the morphosyntactic relations between distributive numerals of various contextual series—e.g. adnominal, adverbal, qualifying verbs, and of various absolute series—e.g. ordinary, restrictive, ordinal. The following two universals may be characterized as principles of compositionality for contextual and absolute series of distributive numerals respectively. What these universals say is that if a language has distributive numerals of a particular series, these are formed by a combination of the morphosyntactic strategies used to mark distributivity, and those used to form non-distributive numerals of that particular series. For example, if a language has distributive restrictive numerals, these are formed by a combination of the strategies used to form ordinary distributive numerals and restrictive (non-distributive) numerals.

Universal 10 governs the compositionality of ordinary distributive numerals of various contextual series:
(20) **Universal 10**

Ordinary distributive numerals of contextual series \( y \) are formed from the corresponding cardinal numerals by application of the following morphosyntactic strategies:

a. a non-null marker of distributivity \( S^Y_{\text{dist}} \);

b. a possibly null marker of contextual series \( y \), \( S^Y \), satisfying the following condition:

If there exist ordinary numerals of contextual series \( y \), then \( S^Y \) is identical to the strategy used to form these numerals from their cardinal counterparts.

Universal 10 states, simply, that ordinary distributive numerals of contextual series \( y \) are formed by means of two strategies: a strategy for marking distributivity \( S^Y_{\text{dist}} \) (which, as suggested by the notation, may vary with \( y \)), and a strategy for forming numerals of contextual series \( y \), \( S^Y \). For example, the Georgian adverbial distributive numeral *sam-samat* is formed by reduplication, bearing the semantic effect of distributivity \( (S^Y_{\text{adv}}) \), and by the adverbial case marking suffix -*at* \( (S^Y_{\text{adv}}) \). We shall now consider, in turn, the ways in which Universal 10 accounts for the forms of adnominal distributive numerals, adverbial distributive numerals, and distributive numerals qualifying verbs.

In the case of adnominal distributive numerals, the "if clause" in (b) is always met—for the "ordinary numerals of contextual series \( y \)" are, simply, the cardinal numerals. Since the cardinal numeral series is morphosyntactically basic, \( S^{\text{adnom}} = S^Y \) is always null—and hence, adnominal distributive numerals are formed directly from their cardinal counterparts by a single morphosyntactic stragegy \( S^{\text{adn}}_{\text{dist}} \). Universal 10 thus captures the fact, pointed out in section 2.3.1, that adnominal distributive numerals are the most basic distributive numeral series morphosyntactically; adnominal distributive numerals may not be derived.
from distributive numerals of other contextual series, though—as we shall now see—distributive numerals of other contextual series may be derived from adnominal distributive numerals.

Turning to adverbial distributive numerals, we may wish to distinguish between three possible classes of \( S_{\text{dist}}^{\text{adv}} \) and four possible classes of \( S_{\text{dist}}^{\text{adv}} \)—yielding a grand total of twelve morphosyntactic types of adnominal distributive numerals. Beginning with the strategy for marking distributivity \( S_{\text{dist}}^{\text{adv}} \), we may distinguish three possible relations borne by \( S_{\text{dist}}^{\text{adv}} \) to its adnominal counterpart \( S_{\text{dist}}^{\text{adv}} \)—these three relations are exemplified below. (In all the examples that follow in the remainder of this section, the numerals are to be glossed as "three". In (21) below, the outputs of \( S_{\text{dist}}^{\text{adv}} \) and \( S_{\text{dist}}^{\text{adv}} \) are underlined, for ease of reference.)

(21) a. no \( S_{\text{dist}}^{\text{adv}} \)

\[
\begin{align*}
\text{Hebrew} & \quad \text{sloša sloša} & (S_{\text{dist}}^{\text{adv}}) \\
\text{Tagalog} & \quad \text{tatlu-tatlo} & (S_{\text{dist}}^{\text{adv}}) \\
\text{Georgian} & \quad \text{sam-samat} & (S_{\text{dist}}^{\text{adv}}) \\
\end{align*}
\]

b. \( S_{\text{dist}}^{\text{adv}} \neq S_{\text{dist}}^{\text{adv}} \)

\[
\begin{align*}
\text{Tagalog} & \quad \text{tigtatlo} & (S_{\text{dist}}^{\text{adv}}) \\
\end{align*}
\]

c. \( S_{\text{dist}}^{\text{adv}} = S_{\text{dist}}^{\text{adv}} \)

\[
\begin{align*}
\text{Georgian} & \quad \text{sam-sami} & (S_{\text{dist}}^{\text{adv}}) \\
\end{align*}
\]

Next, with respect to \( S_{\text{adv}}^{\text{adv}} \), we may distinguish between four cases, depending on whether \( S_{\text{adv}}^{\text{adv}} \) is null or non-null, and on whether there exist non-distributive adverbial numerals satisfying the "if clause" in (b). (In (22) below, the output of \( S_{\text{adv}}^{\text{adv}} \), where non-null, is underlined.)

326

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
(22) a. $S^{adv}$ null, non-distributive adverbial numerals exist

   Hebrew
   šloša šloša

b. $S^{adv}$ null, no non-distributive adverbial numerals exist

   Romanian
   cite trei

c. $S^{adv}$ non-null, non-distributive adverbial numerals exist

   Georgian
   sam-samat

d. $S^{adv}$ non-null, no non-distributive adverbial numerals exist

   Turkish
   üçer üçer

The various distinctions exemplified in (21) and (22) generate twelve logically possible morphosyntactic types of adverbial distributive numerals in relation to their adnominal counterparts—thereby constituting a refinement of the classification scheme proposed in section 2.3.1.

To go through all twelve possibilities is unnecessary and laborious; instead, we shall just note one particular case of importance, namely, that for which $S^{adv}_{dist} = S^{adn}_{dist}$—as in (21c), and $S^{adv}$ is null—as in (22a,b). This is the case for which adnominal and adverbial numerals are identical in form, e.g. Hausa úkù úkù—morphology thereby reflecting to the maximally possible extent the underlying logical unity of adnominal and adverbial distributive numerals.

Universal 10 accounts for the forms of distributive numerals qualifying verbs in much the same way as it accounts for the forms of adverbial distributive numerals, though, here, the number of distinct cases is fewer. To begin, since a language has ordinary distributive numerals qualifying verbs if and only if it has ordinary adnominal distributive numerals (Universal 2), we need distinguish only the
following two possible relations between distributive numerals qualifying verbs and adnominal distributive numerals—the case co-responding to (21a), with no $S_{\text{adn}}^{\text{dist}}$, being ruled out. (In (23), the relevant distinction is illustrated by two alternative strategies for forming distributive numerals qualifying verbs in the same language—Tagalog; in each case, the outputs of $S_{\text{qv}}^{\text{dist}}$ or of $S_{\text{adn}}^{\text{dist}}$ are underlined.)

(23) a. $S_{\text{qv}}^{\text{dist}} \neq S_{\text{adn}}^{\text{dist}}$

Tagalog

tatlu-tatlong beses (S_{\text{qv}}^{\text{dist}})
tigtatlo (S_{\text{adn}}^{\text{dist}})

b. $S_{\text{qv}}^{\text{dist}} = S_{\text{adn}}^{\text{dist}}$

Tagalog

tigtatlong beses (S_{\text{qv}}^{\text{dist}})
tigtatlo (S_{\text{adn}}^{\text{dist}})

Next, with respect to $S_{\text{qv}}^{\text{dist}}$, since all languages have ordinary numerals qualifying verbs, we need distinguish only the following two cases—and not four, as in (22). (In (24), the output of $S_{\text{qv}}^{\text{dist}}$ is underlined, where non-null.)

(24) a. $S_{\text{qv}}^{\text{dist}}$ null

Maricopa

xmokxperk

b. $S_{\text{qv}}^{\text{dist}}$ non-null

Tagalog

tigtatlong beses

Again, as for adverbial distributive numerals, we may wish to single out the particular case in which $S_{\text{qv}}^{\text{dist}} = S_{\text{adn}}^{\text{dist}}$ and $S_{\text{qv}}^{\text{dist}}$ is null—resulting in the formal identity of adnominal distributive numerals and distributive numerals qualifying verbs, e.g. Maricopa $xmokxperk$; this case, too, underscores the logical unity of distributive numerals qualifying
constituents belonging to the different syntactic categories of noun and verb.

A similar, somewhat simpler principle of compositionality holds for distributive numerals of various absolute series:

(25) **Universal 11**

If a language satisfies the following conditions:

a. It has distributive numerals of absolute series \( x \) and contextual series \( y \);

b. It forms adnominal numerals of absolute series \( x \) by application of morphosyntactic strategy \( S^x \) to the corresponding cardinal numerals:

c. It forms distributive numerals of contextual series \( y \) by application of morphosyntactic strategies \( S^y_{\text{dist}} \) and \( S^y \); Then it forms distributive numerals of absolute series \( x \) and contextual series \( y \) by application of \( S^x \), \( S^y_{\text{dist}} \), and \( S^y \) to the corresponding cardinal numerals.

Universal 11 states that distributive numerals of absolute series \( x \) are formed by means of three strategies: that used to form non-distributive numerals of absolute series \( x \), \( S^x \), and the two strategies used to form ordinary distributive numerals of the same contextual series, namely \( S^y_{\text{dist}} \) and \( S^y \)--cf. Universal 10. Universal 11 is illustrated with respect to restrictive and ordinal distributive numerals in Table 1 below. In Table 1, the joint output of \( S^y_{\text{dist}} \) and \( S^y \) is marked with a single underline, while the output of \( S^x \) is marked with a double underline. The forms in the final column indicate the compositional nature of the strategies forming various distributive numeral series. Thus, for example, English restrictive adverbial only in threes consists of cardinal numeral **three** (column 1) plus output of \( S^y_{\text{dist}} \) and \( S^y \) in... -s (column 2) plus output of \( S^x \) only (column 3).
<table>
<thead>
<tr>
<th></th>
<th>LANGUAGE</th>
<th>CARDINAL NUMERAL</th>
<th>DISTRIBUTIVE NUMBERAL OF SERIES y</th>
<th>NUMERAL OF SERIES x</th>
<th>DISTRIBUTIVE NUMBERAL OF SERIES x AND y</th>
</tr>
</thead>
<tbody>
<tr>
<td>restrictive</td>
<td>adnominal</td>
<td>Turkish</td>
<td>üç</td>
<td>üçer</td>
<td>yalnızca üç</td>
</tr>
<tr>
<td></td>
<td>adverbial</td>
<td>English</td>
<td>three</td>
<td>in threes</td>
<td>only three</td>
</tr>
<tr>
<td></td>
<td>qualifying</td>
<td>Georgian</td>
<td>sami</td>
<td>sam-samjer</td>
<td>mxolod sami</td>
</tr>
<tr>
<td></td>
<td>verb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ordinal</td>
<td>adnominal</td>
<td>Fox</td>
<td>nesw</td>
<td>naneswi</td>
<td>nesonymeg</td>
</tr>
<tr>
<td></td>
<td>qualifying</td>
<td>Tagalog</td>
<td>tatlo</td>
<td>tatlu-tatlong</td>
<td>ikatlo</td>
</tr>
<tr>
<td></td>
<td>verb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Morphosyntactic Compositionality of Distributive Numerals
In general, then, distributive numerals are formed by the application of three morphosyntactic strategies, $s_{\text{dist}}^y$, $s^y$, and $s^x$, to the corresponding cardinal numerals—even though, in particular cases, one or two of the strategies may be null. Thus, for example, for ordinary numerals $s^x$ is null (hence it was not mentioned in Universal 10); similarly, for adnominal numerals $s^y$ is null. In other cases, however, none of the strategies are null; for example, Tagalog *ikaikatlong beses* is formed by prefixation of *ika-* ($s^x$), initial reduplication ($s^y_{\text{dist}}$), and addition of ligature -ng plus beses ($s^y$).

Note that for Tagalog *ikaikatlong beses*, prefixation of *ika- must occur before initial reduplication, if the correct output is to be obtained. More generally, it may be queried whether the three strategies $s^y_{\text{dist}}$, $s^y$, and $s^x$ are subject to any universal ordering constraints. Available evidence supports the following two universals governing the order of morphosyntactic strategies forming distributive numerals:

(26) **Universal 12**

In the formation of adverbial distributive numerals, $s_{\text{dist}}^{\text{adv}}$ precedes $s^{\text{adv}}$.

Universal 12 may be illustrated in the following diagrams:

(27) a. **Pampangan** (Blake 1907:238)

```
  atlo  \(s_{\text{dist}}^{\text{adv}}\)  \(s_{\text{adv}}\)  \(s_{\text{adv}}\)  \(s_{\text{adv}}\)  \(s_{\text{adv}}\)
  \(s_{\text{adv}}\)  atloatlo  \(s_{\text{adv}}\)  titlotitlo  (*titloatlo)
```
b. Cebuano

\[
\begin{align*}
\text{tolo} & \quad \text{s}_{\text{adv}} \quad \text{dist} \quad \rightarrow \quad \text{tagutlo} \\
\text{s}_{\text{adv}} & \quad \downarrow \quad \rightarrow \quad \text{ttagutlo} \\
*\text{tinolo} & \quad \downarrow \quad \rightarrow \quad \text{tinagutlo} \\
\end{align*}
\]

\text{c. Georgian}

\[
\begin{align*}
\text{sam} & \quad \text{s}_{\text{adv}} \quad \text{dist} \quad \rightarrow \quad \text{sam-sam} \\
\text{s}_{\text{adv}} & \quad \downarrow \quad \rightarrow \quad \text{sam-samat} \\
\text{samamat} & \quad \downarrow \quad \rightarrow \quad \text{sam-samat} \\
\end{align*}
\]

\text{d. Turkish}

\[
\begin{align*}
\text{uç} & \quad \text{s}_{\text{adv}} \quad \text{dist} \quad \rightarrow \quad \text{uçer} \\
\text{s}_{\text{adv}} & \quad \downarrow \quad \rightarrow \quad \text{uçer.upper} \\
*\text{uç upper} & \quad \downarrow \quad \rightarrow \quad \text{uç upper} \\
\end{align*}
\]

\text{e. Rumanian}

\[
\begin{align*}
\text{trei} & \quad \text{s}_{\text{adv}} \quad \text{dist} \quad \rightarrow \quad \hat{\text{c}}\text{ite trei} \\
\text{s}_{\text{adv}} & \quad \downarrow \quad \rightarrow \quad \hat{\text{c}}\text{ite trei} \\
*\text{trei trei} & \quad \downarrow \quad \rightarrow \quad \hat{\text{c}}\text{ite trei} \\
\end{align*}
\]

Thus, for example, in Pampangan, \text{s}_{\text{adv}} \quad \text{dist} \quad \text{is a rule prefixing} \quad \text{ti-} \quad \text{with morphophonemic adjustments, while} \quad \text{s}_{\text{adv}} \quad \text{is a rule of reduplication. As indicated by the form *atloatlo, Pampangan has no non-distributive ad-}
\text{verbial numerals (contra Georgian, which has). The gist of the diagram is that} \quad \text{s}_{\text{adv}} \quad \text{must apply before} \quad \text{s}_{\text{adv}} \quad \text{if they were to apply in the op-}
\text{posite order, the result would be the ungrammatical *titloatlo, indicated in parentheses.}^{12} \quad \text{Analogous conclusions may be drawn from the data in}
\text{Cebuano, Georgian, Turkish, and Rumanian.}^{13}

332
Interestingly, it is not possible to formulate an analogous universal with respect to the other contextual series of distributive numerals: as indicated in (28) below, \( s^\text{dist}_{qv} \) may either precede \( s^\text{qv} \), as in Georgian, or follow it, as in Circassian:

(28) a. **Georgian**

\[
\begin{array}{ccc}
\text{sam} & \xrightarrow{s^\text{qv}} & \text{sam-sam} \\
\downarrow & & \downarrow \\
\text{samjer} & \rightarrow & \text{sam-samjer} (*\text{samjer-samjer})
\end{array}
\]

b. **Circassian** (Černyševa 1957:79-81, Šagirov 1967:170-172)

\[
\begin{array}{ccc}
\mathcal{S} & \xrightarrow{s^\text{qv}} & \mathcal{S}\mathcal{R}\mathcal{E} \\
\downarrow & & \downarrow \\
\mathcal{S}\mathcal{Z} & \rightarrow & \mathcal{S}\mathcal{R}\mathcal{E}\mathcal{E} (*\mathcal{S}\mathcal{R}\mathcal{E})
\end{array}
\]

With regard to the various absolute series of distributive numerals, the following universal is supported by the available data:

(29) **Universal 13**

In the formation of distributive restrictive numerals, \( s^\text{dist}_{y} \) and \( s^y \) precede \( s^\text{rest} \).

The following three cases may be distinguished: (a) \( s^\text{dist}_{y} \), \( s^y \) and \( s^\text{rest} \) all morphological strategies; (b) \( s^\text{dist}_{y} \) and \( s^y \) morphological, \( s^\text{rest} \) syntactic; and (c) \( s^\text{dist}_{y} \), \( s^y \), and \( s^\text{rest} \) all syntactic. These three cases are illustrated in (30)-(32) respectively:
(30) a. Tagalog
\[
\begin{array}{c}
\text{tatlo} \xrightarrow{s_{\text{dist}}^Y s_{\text{rest}}^Y} \text{tigtatlo} \\
\downarrow \text{s_{\text{rest}}^Y} \\
\text{tatatlo} \\
\end{array}
\quad
\begin{array}{c}
\text{tigtatlo} \\
\downarrow \text{s_{\text{rest}}^Y} \\
\text{titigtatlo} \quad (*\text{tigtatlo})^{14}
\end{array}
\]

b. Maricopa
\[
\begin{array}{c}
\text{xmokk} \xrightarrow{s_{\text{dist}}^Y s_{\text{rest}}^Y} \text{xmokxperk} \\
\downarrow \text{s_{\text{rest}}^Y} \\
\text{xmoktk}
\end{array}
\quad
\begin{array}{c}
\text{xmokxperk} \quad (*\text{xmoktxperk})
\end{array}
\]

(31) a. Turkish
\[
\begin{array}{c}
\text{"uç} \xrightarrow{s_{\text{dist}}^Y s_{\text{rest}}^Y} \text{"ücer} \\
\downarrow \text{s_{\text{rest}}^Y} \\
\text{yalnızca "uç}
\end{array}
\quad
\begin{array}{c}
\text{yalnızca "ücer}
\end{array}
\]

b. Bura
\[
\begin{array}{c}
\text{máakər} \xrightarrow{s_{\text{dist}}^Y s_{\text{rest}}^Y} \text{máamáakər} \\
\downarrow \text{s_{\text{rest}}^Y} \\
\text{máakər dâaci} \\
\end{array}
\quad
\begin{array}{c}
\text{máamáakər dâaci}
\end{array}
\]

(32) a. Rumanian
\[
\begin{array}{c}
\text{trei} \xrightarrow{s_{\text{dist}}^Y s_{\text{rest}}^Y} \text{înte trei} \\
\downarrow \text{s_{\text{rest}}^Y} \\
\text{numai trei}
\end{array}
\quad
\begin{array}{c}
\text{numai înte trei} \quad (*înte numai trei)
\end{array}
\]

b. English
\[
\begin{array}{c}
\text{three} \xrightarrow{s_{\text{dist}}^Y s_{\text{rest}}^Y} \text{in threes} \\
\downarrow \text{s_{\text{rest}}^Y} \\
\text{only three}
\end{array}
\quad
\begin{array}{c}
\text{only in threes} \quad (*\text{in only threes})
\end{array}
\]

334
Universals 7-13 governing the morphosyntax of distributive numerals are of importance not only to a theory of morphology, but, in addition, to any semantic theory that attaches importance to a close correspondence between logical forms and surface syntactic forms. Space does not permit detailed discussion of the many semantic morals suggested by the morphology—but at least some of these should be obvious. Presumably, the logical representation of a distributive numeral will reflect, inter alia, its morphological constituency. Thus, for example, the ordering constraint proposed in Universal 13 may suggest that the logical relation of distributivity is—in some sense to be defined—wholly contained within the scope of a restricting operator corresponding to "only". More generally, the fact that distributive numerals are, in general, derived by morphosyntactic processes from cardinal numerals suggests that they are also semantic derivatives of their cardinal counterparts—containing, in addition to the notion of number, the semantic relation of distributivity. Many promising avenues of future research would appear to be present in this area.

9.3 Semantic Universals

We now turn to consider—in a more direct fashion—the various semantic generalizations to emerge in the course of the present study. More than in other sections, the results presented here are to be considered as extremely tentative, in that they are based almost exclusively on my own elicitations from a limited sample of speakers and languages. However, in spite of their tentative nature, their importance to any theory of natural language will, hopefully, be quite evident.

The first semantic universal reflects the discussion of the nature of distributivity in section 4.1. It is of considerable empirical import,
in that it greatly restricts the class of possible denotations of
natural language numerals.

(33) **Universal 14**

If the semantics of a non-ordinary numeral differs from that
of the corresponding ordinary numeral, inter alia, in the values
of the following parameters:

a. individual/collective interpretations

b. scope relations

Then the non-ordinary numeral induces a relation of distributivity.

Universal 14 asserts the primacy of the relation of distributivity over
all other relations involving individual collective interpretations and
scope relations. To appreciate how far reaching the effect of Universal
14 is, let us try to construct hypothetical counterexamples to Universal
14. English, for example, would have counterexamples to Universal 14 if,
for some or all of the sentences in (34-38a), non-ordinary numerals
three\(^1\) to three\(^5\) were available rendering (34-38b) grammatical and
synonymous to the respective sentences in (34-38a).

(34) a. John carried three suitcases separately
   b. John carried three\(^1\) suitcases

(35) a. John carried three suitcases together
   b. John carried three\(^2\) suitcases

(36) a. John and Bill carried three suitcases between them
   b. John and Bill carried three\(^3\) suitcases

(37) a. John carried three suitcases and Bill carried three suitcases
   b. John and Bill carried three\(^4\) suitcases
(38) a. John carried three suitcases separately and Bill carried three suitcases separately

b. John and Bill carried three suitcases

I am aware of absolutely no reason whatsoever why every natural language has distributive numerals, but, apparently, no natural language has numerals corresponding to three and three above. Let us now examine these hypothetical numerals somewhat more closely.

The first two hypothetical counterexamples to Universal 14---three and three---affect only the interpretation of the direct object NP: three forces an individual interpretation, while three forces a collective interpretation. These would seem to be useful items for natural languages to have--but, surprisingly, no natural language seems to make use of such numerals. The next two hypothetical counterexamples---three and three---affect only the scope relations between the subject and the direct object NPs: three forces a weak symmetric interpretation, whereas three forces the subject NP to have wider scope than the direct object NP. Again, I see no obvious reason why languages do not have such numerals--but they do not. (Of course, an adnominal distributive numeral formed from three might induce the same scope relation as three, but it would also force the subject NP to be interpreted individually, while three does not.) Finally, three--alone of the five hypothetical counterexamples---affects both individual-collective interpretations and scope relations; however, it does so in a way different than that required by Universal 14. Like a distributive numeral, it forces the direct object NP to be within the scope of the subject NP, but--unlike a distributive numeral--it forces the expression with narrow
scope to be interpreted individually, rather than the expression with wide scope. The expression three⁵ is thus a *distributive numeral, in the sense of *distributivity defined in section 4.1. However, like three¹ - three⁴, it is, apparently, an impermissible type of expression for any natural language to have.

Clearly, it is possible to define an arbitrarily large number of such numerals, affecting the values of the two semantic parameters in question in variegated ways. However, natural languages do not have such numerals. This, to my mind, is an extremely surprising fact. Certainly no extra-linguistic phenomena can be invoked to account for this universal. Sentences (34-38a), for example, denote states of affairs that are just as plausible as those states of affairs that would be described by a comparable construction with a distributive numeral: if English had numerals three¹ - three⁵, they would definitely come in handy. The explanation, then, must be linguistic. But in view of the universality of the phenomenon, there would seem to be no alternative other than to attribute Universal 14 directly to the constitution of the human mind. That is to say, languages have distributive numerals but no numerals three¹ - three⁵ because we think in terms of distributivity, not in terms of any number of other potentially possible logical relations. (I do not address here the question to what extent inateness explanations are indeed explanations.) Whatever the mental status of Universal 14, however, it clearly provides a striking illustration of the arbitrariness--in the Saussurean sense--of natural language semantics. On a less philosophical plane, it also attests to the requisite centrality of the notion of distributivity within any would be theory of natural language semantics.

338
Whereas Universal 14 states that all numerals affecting individual/collective interpretations and scope relations must induce distributivity, Universal 15 stipulates that they must do so in a particular way.

(39) Universal 15

If a numeral forces constituent A to distribute over constituent B, it must occur within A.

On the heels of its predecessor, Universal 15 further restricts the class of possible denotations of natural language numerals in a surprising way. As for Universal 14, we may characterize a hypothetical counterexample to Universal 15; this would be a numeral three⁶ rendering (40b) synonymous to (40a):

(40) a. Three men carried two suitcases each
    b. Three⁶ men carried two suitcases

If numerals such as three⁶ existed, we would in all likelihood call them distributive numerals—since, like bona fide distributive numerals, they induce a relation of distributivity. However, unlike a true adnominal distributive numeral, three⁶ occurs in the constituent distributed over, rather than in the constituent distributing. (A sentence synonymous with (40a) would have to have a distributive numeral within the direct object NP, not the subject.)

Counterexamples to Universal 15 may exist. One possible class of counterexamples was discussed in section 8.4—involving complex stacked numeral constructions in Maricopa, and, perhaps, also in Buginese and Nubian—cf. footnote 26. Another possible class of counterexamples involves data such as the following:
(41) a. Dyirbal
   -jaran "each of two"
   b. Latin
   uterque "each of two"

While I do not have available sufficient information on the semantics of such constructions, the glosses provided would appear to indicate that they correspond to our hypothetical two. All of these counterexamples, however, are at best extremely restricted in nature.

It is thus an additional intriguing fact about the possible denotations of natural language numerals that distributive numerals always mark the constituent that distributes, and never the constituent distributed over. What is even more surprising is that while no language seems to have a three, most or all languages have an all, that is, a universal quantifier signifying, in addition, that the constituent in which it occurs is distributed over—e.g. English every, French chaque, Russian kazdi, Tagalog bawat, Georgian q'veli, Maricopa maty camk. Thus, while (42a) is ruled out by Universal 15, (42b) is commonplace.

\[
\begin{align*}
(42) & \quad \text{a. } *[\text{Three men} \text{ carried [two suitcases]}] \\
& \quad \text{b. } [\text{Every man} \text{ carried [two suitcases]}]
\end{align*}
\]

Why there should exist such an asymmetry between numerals and the universal quantifier is puzzling to me.

Universals 14 and 15 thus present a challenge to any would be theory of natural language quantification—namely, to explain why distributive numerals are so cross-linguistically widespread, while at
the same time, so many other logically conceivable types of numerals are completely unattested.

As was argued in chapter 4, distributivity is a binary semantic relation that may obtain between constituents of various syntactic categories within phrases and clauses. Universals 16–18 below govern the possible domains over which distributive numerals may induce distributivity, summarizing the major results of chapter 5.

(43) Universal 16

For any distributive numeral, there exist constructions in which it distributes over its classifier head.

Universal 16—and the lack of corresponding universals with respect to other domains of distributivity, e.g. clausal, external—reflect the fact that the most basic domain of distributivity induced by distributive numerals is of the distributive numeral itself over its classifier head. Thus, for every speaker examined, and for every distributive numeral in the speaker's language, there were some constructions in which the distributive numeral distributed over its classifier head. Conversely, some speakers had distributive numerals which in no constructions whatsoever would induce clausal distributivity, or external distributivity over conjunctions.

Universal 16 holds true in spite of the large degree of idiolectal variation evident in the domains of distributivity induced by distributive numerals. Let us consider, as an illustrative example, the judgements offered by two speakers of Georgian of constructions involving adnominal distributive numerals—as discussed in chapters 5 and 7. The first speaker exhibited a general preference for interpretations
involving clausal distributivity: when the sentences offered were such that no interpretations involving clausal distributivity were available—e.g. (15b), (36c) chapter 5, they were often judged to be ungrammatical. However, in a few construction types, she was willing to accept interpretations involving phrase-internal distributivity of the distributive numeral over its classifier head—thereby upholding Universal 16; these were typically sentences in which the distributive numeral occurred with a subject NP—e.g. (21b), (28b) chapter 5. The second Georgian speaker exhibited a quite different and much simpler pattern of preferences: in most or all constructions, she was willing to accept only interpretations involving phrasal distributivity of the distributive numeral over its classifier head. Her judgements thus accorded maximally with the spirit of Universal 16. Moreover, the fact that she would not accept interpretations involving clausal or external distributivity indicates the impossibility of formulating universals analogous to 16 for these domains of distributivity. The pattern of variation exhibited by these two speakers of Georgian is, in general, quite typical of patterns of idiolectal and cross-linguistic variation in the interpretations of sentences containing distributive numerals. As indicated by the validity of Universal 16, however, such variation does not preclude the formulation of substantive linguistic universals governing the semantics of distributive numerals.

Universal 16 thus stipulates that the most basic domain of distributivity induced by distributive numerals is of the distributive numeral over its classifier head. This, then, is the major feature distinguishing distributive numerals from adverbial markers of
distributivity, e.g. English each, and from verbal ones, e.g. Batak marsi- --which induce clausal, rather than phrasal distributivity.\textsuperscript{18}

As shown in chapter 5, however, adnominal distributive numerals may also induce distributivity over a variety of other syntactic domains. In contrast, adverbial distributive numerals have a more restricted range of interpretations, being governed by the following two generalizations:

(44) **Universal 17**

Adverbial distributive numerals never induce clausal distributivity over noun phrases.

(45) **Universal 18**

Adverbial distributive numerals never induce external distributivity over conjunctions.

Thus, adverbial distributive numerals may induce only phrasal distributivity over their classifier heads, or clausal distributivity over a verbal phrase. The class of permissible domains of distributivity of adverbial distributive numerals appears rather unnatural, cross-cutting the distinction between phrasal and clausal distributivity; I have no explanation for why adverbial distributive numerals behave in the way they do. Providing some principled motivation for universals 17 and 18 offers a challenge to any theory of natural language quantification.\textsuperscript{19}

A further universal of a negative nature governing the domains of distributivity induced by distributive numerals remains to be stated:

(46) **Universal 19**

No language has different distributive numeral series syntactically identical but differing semantically only in the possible domains over which distributivity obtains.
Conceivably, languages would find it useful to have alternative distributive numeral forms for, say, phrasal and clausal distributivity. For example, one of the languages exemplified in example (1) chapter 2 might have three distinct adnominal numerals forcing classes A, B, and C of interpretations respectively. But although many languages have other devices forcing particular domains of distributivity—e.g. adverbial or verbal markers of distributivity forcing clausal distributivity over NPs, no languages would appear to make use of alternative distributive numeral series for this purpose.20

The final semantic universal to be proposed in this section is of considerable generality. Its primary effect is to provide a semantic constraint on the grammaticality of constructions involving distributive numerals. As we shall see, however, it has an additional effect of far reaching consequences—namely, to set the ground for a typological characterization of languages possessing adnominal distributive numerals.

(47) Universal 20

Expressions of syntactic category Y may contain a distributive numeral inducing distributivity over expressions of syntactic category X if and only if arbitrary expressions of syntactic category Y may distribute over arbitrary expressions of syntactic category X and may contain a numeral.

Graphically, what Universal 20 says is that (48a) may hold if and only if (48b) may hold:

(48) a. \[ Y \ldots \text{Dist Num} \ldots \] \[ X \]
   b. \[ Y \] \[ X \] and \[ Y \ldots \text{Num} \ldots \]

We shall now begin to consider applications of Universal 20.
First, Universal 20 accounts straightforwardly for the fact that the occurrence of adnominal distributive numerals is governed by the grammatical relations hierarchy, as discussed in section 5.1.2, whereby distributive numerals are more likely to occur within direct object NPs than within subject NPs. To see this, let X denote the category of direct object NP, and let Y denote the category of subject NP. Trivially, a subject NP may contain a numeral. However, arbitrary subject NPs may not generally distribute over arbitrary direct object NPs—since this would violate the grammatical relations quantifier scope hierarchy. Hence—according to Universal 20—subject NPs may not contain distributive numerals inducing distributivity over direct object NPs. Conversely, letting X denote the category of subject NP and Y denote the category of direct object NP, Universal 20 predicts that direct object NPs may contain distributive numerals inducing distributivity over subject NPs. Universal 20 thus accounts for the correlation between the occurrence of adnominal distributive numerals and the acceptability of quantifier scope dependencies—both being governed by the same grammatical relations hierarchy. \(^{21}\)

As we shall now see, Universal 20 may determine not only where distributive numerals may occur, but, also, what types of distributive numerals a language may have—in particular, whether a language has distributive numerals of the adnominal variety. Let Y denote the category of nominal modifiers, including nouns, adjectives, verbs, and determiners; and let X denote the category of head nominal phrase—leaving open whether this includes common noun phrases, determined noun phrases, or, perhaps, an undifferentiated nominal supercategory.
Observe, now, that while nouns, adjectives, and verbs may distribute over their nominal heads, determiners may not:

(49) a. [John's] → [students]
    b. [Clever] → [students]
    c. [The students] ← [flunked]
    d. *[Three] → [students]

Of course—as was shown at some length in chapter 4—not all nouns, adjectives and verbs need distribute over their heads, but for our present purpose it suffices that some may, as in (49a-c). Determiners, however, may never distribute over their heads; this is a logical consequence of the fact that by definition, they combine with common noun phrases to yield determined noun phrases. Given the above facts, Universal 20 now makes the following prediction:

(50) Expressions of syntactic category Y may contain a distributive numeral inducing distributivity over head nominal phrases if and only if Y is noun, adjective, or verb, and Y may contain a numeral.

Or, viewing things in the opposite direction, determiners may not distribute over head nominal phrases, hence, they may not contain distributive numerals.

Let us now take the simple further step of replacing the two occurrences of "contain" in (50) with two occurrences of "consist wholly of"—in (51) below. (Although "consist wholly of" is a particular case of "contain", statement (50) does not entail statement (51), since, in (50), "contain" occurs on both sides of the "if and only if". Nevertheless, if (50) is true, (51) is reasonably likely to be true as well.)
Expressions of syntactic category $Y$ may consist wholly of a distributive numeral inducing distributivity over head nominal phrases if and only if $Y$ is noun, adjective, or verb, and $Y$ may consist wholly of a numeral.

Statement (51) deserves to be translated into more ordinary English.

Note that if $Y$ consists wholly of a distributive numeral, this distributive numeral is, perforce, adnominal (since, by assumption, $Y$ is a nominal modifier). Statement (51) is thus equivalent to the following:

A language had adnominal distributive numerals inducing distributivity over their head nominal phrases if and only if numerals may be nouns, adjectives, or verbs.

Recall, now, Universal 16, which stipulates, inter alia, that all adnominal distributive numerals may induce distributivity over their nominal heads (or, more precisely, over their classifier heads). In view of Universal 16, statement (52) may be simplified as follows:

A language has adnominal distributive numerals if and only if numerals may be nouns, adjectives, or verbs.

Statement (53) thus provides a characterization of those languages possessing adnominal distributive numerals. A language has adnominal distributive numerals if and only if it has numeral expressions that are subsumed under the categories of noun, adjective, or verb. Equivalently, a language has no adnominal distributive numerals if and only if all its numeral expressions belong to the category of determiner. Statement (53) is a consequence, albeit an indirect one, of Universal 20.

Adnominal distributive numerals may be nouns, adjectives, or verbs, since nouns, adjectives, or verbs may distribute over their nominal heads—and, according to Universal 20 and a few additional assumptions, distributive numerals may only induce distributivity over domains in
which it may obtain in any case. Similarly, adnominal distributive numerals may never be determiners, since determiners may never distribute over their nominal heads.

Is statement (53) empirically justified? The facts considered in this dissertation all seem to support it. In chapters 6 - 8 we conducted detailed investigations of three languages possessing adnominal distributive numerals—Tagalog, Georgian, and Maricopa. In those chapters, it was suggested that numerals are nouns in Tagalog, adjectives in Georgian, and verbs in Maricopa. All three languages thus support statement (53). Conversely, English has no adnominal distributive numerals, and in English, numerals are, apparently, determiners. Thus, English, too, would appear to uphold statement (53).

A more complete investigation of the validity of statement (53) would require detailed grammatical studies of a sufficiently large sample of languages—a herculean task that we shall not endeavor here. In the next section, however, we shall attempt to tackle this hypothesis from a slightly different angle, one that may render it a little more amenable to adequate empirical verification.

9.4 Adnominal Distributive Numerals and the N/N Distinction

Towards the end of the previous section, we arrived at the prediction that a language has adnominal distributive numerals if and only if it has numeral expressions that are subsumed under the categories of noun, adjective, or verb. Note, however, that if a language has determiners, numerals are among the most likely candidates for membership in such a category. Hence, if a language has nominal, adjectival, or verbal numeral expressions, it is less likely to have a well defined
syntactic category of determiner. Or, equivalently, it is less likely
to distinguish clearly between the syntactic categories of common and
determined noun phrases (or N and \( \overline{N} \)). Statement (53) may accordingly
be reformulated in terms of the following hypothesis:

(54) A language has adnominal distributive numerals if and only
if it does not distinguish clearly between common and determined
noun phrases.

Noting that the distinction between common and determined noun phrases
is only viable for count nouns, (54) is equivalent to the following:

(55) A language has adnominal distributive numerals if and only if
it does not distinguish clearly between count and mass nouns,
i.e. it treats all nouns as mass.

In chapters 6 - 8, it was argued that Tagalog, Georgian, and
Maricopa, possessing adnominal distributive numerals, do not distinguish
between common and determined noun phrases. In the course of the argu-
mentation, reference was made to a number of relatively easily observ-
able grammatical features which reflect the common/determined noun
phrase distinction—and, hence, may serve as testable consequences of
hypotheses (54) and (55). One of the more obvious hallmarks of lan-
guages distinguishing between common and determined noun phrases is the
existence of a well developed article system; this is because an article,
if obligatory, creates a syntactic distinction between the bare noun to
which it applies (i.e. the common noun phrase) and the resulting noun
plus article construction (i.e. the determined noun phrase). A second
salient hallmark of languages distinguishing common and determined noun
phrases is the presence of a productive nominal plural marking; this is
because the notion of plurality is well defined only with respect to
count nouns—not with respect to mass nouns. The following testable consequences of (54) and (55) may accordingly be stated as possible linguistic universals:

(56) Universal 21

A language is likely to have adnominal distributive numerals if and only if it does not have indefinite or definite articles, or, if it has, their use is optional.

(57) Universal 22

A language is likely to have adnominal distributive numerals if and only if it does not have nominal plural marking, or, if it has, its use is optional.

(The probabilistic hedge "is likely to" in Universal 21 and 22 takes into consideration the fact that the two linguistic features in question—article systems and plural marking, may not be infallible predictors of the existence of a common/determined noun phrase distinction in a language.)

How do these two universals fare? Table 2 examines ten languages possessing adnominal distributive numerals—the same ten languages whose adnominal distributive numeral constructions are exemplified in (1) chapter 2, while Table 3 examines three languages not possessing adnominal distributive numerals.23 For each language in each table, the values of three grammatical parameters are presented: whether it has indefinite articles, whether it has definite articles, and whether it has nominal plural marking. The symbol "+" represents obligatory use of the feature in question wherever semantically appropriate, the symbol "-" indicates that the feature in question does not exist in that language, and the symbol "?" denotes any of a number of intermediate states of affairs—e.g. optional use of the feature in question,
use only in certain environments, etc. For example, the values for Tagalog in Table 1 indicate that Tagalog has no definite or indefinite articles whatsoever, but makes restricted use of a nominal plural marker: the reader will recall from section 6.1.2 that the plural preposition mga is generally optional, and may not occur in constructions with numerals. Similarly, the values for English in Table 2 indicate that the definite article and nominal plural marking are obligatory wherever semantically appropriate, but that the use of the indefinite article is restricted: this is because English has a singular indefinite article a but no corresponding plural indefinite article.

<table>
<thead>
<tr>
<th>LANGUAGE</th>
<th>INDEFINITE ARTICLE</th>
<th>DEFINITE ARTICLE</th>
<th>PLURAL MARKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tagalog</td>
<td>-</td>
<td>-</td>
<td>†</td>
</tr>
<tr>
<td>Hindi</td>
<td>†</td>
<td>-</td>
<td>†</td>
</tr>
<tr>
<td>Georgian</td>
<td>-</td>
<td>-</td>
<td>†</td>
</tr>
<tr>
<td>Turkish</td>
<td>-</td>
<td>-</td>
<td>†</td>
</tr>
<tr>
<td>Bulgarian</td>
<td>-</td>
<td>†</td>
<td>+</td>
</tr>
<tr>
<td>Rumanian</td>
<td>†</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Nubian</td>
<td>†</td>
<td>-</td>
<td>†</td>
</tr>
<tr>
<td>Bura</td>
<td>-</td>
<td>-</td>
<td>†</td>
</tr>
<tr>
<td>Gã</td>
<td>-</td>
<td>+</td>
<td>†</td>
</tr>
<tr>
<td>Maricopa</td>
<td>-</td>
<td>-</td>
<td>†</td>
</tr>
</tbody>
</table>

Table 2: The N/N Distinction—Languages with Adnominal Distributive Numerals
<table>
<thead>
<tr>
<th>LANGUAGE</th>
<th>INDEFINITE ARTICLE</th>
<th>DEFINITE ARTICLE</th>
<th>PLURAL MARKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>†</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>French</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Hebrew</td>
<td>†</td>
<td>+</td>
<td>†</td>
</tr>
</tbody>
</table>

Table 3: The N/Ñ Distinction—Languages without Adnominal Distributive Numerals

The data presented in Tables 2 and 3 appear to uphold Universals 21 and 22. With respect to indefinite and definite articles, it is the case that languages with adnominal distributive numerals usually have neither—or at best, make restricted use of them. With respect to plural markings, there are no languages in the sample which have no device whatsoever for marking number on at least some nouns. However, a clear difference is still evident between the more restricted use of plural markings made by languages with adnominal distributive numerals, and the more productive use made by languages without adnominal distributive numerals. Obviously, more extensive empirical investigation is necessary before Universals 21 and 22 may be taken to be adequately verified. However, the facts presented in Tables 2 and 3 provide prima facie support for Universals 21 and 22, and, ipso facto, for Universal 20, which—as argued before—underlies the latter two universals.

Universals 21 and 22 support a particular language typology consisting of the following two types: (a) languages distinguishing between
common and determined noun phrases; and (b) languages not distinguishing between common and determined noun phrases. Since the former type of language distinguishes between count and mass nouns while the latter type treats all nouns as mass, we may refer to these two types of languages as count and mass languages respectively. The results presented in the preceding pages indicate that count nouns are more likely to make productive use of indefinite and definite articles and nominal plural markings, but are less likely to have adnominal distributive numerals. Conversely, mass nouns are less likely to make productive use of indefinite and definite articles and nominal plural markings, but are more likely to have adnominal distributive numerals. Further investigation may reveal additional correlates of count and mass languages.  

The count/mass typology is of far reaching import to theories of natural language quantification—in fact, to linguistic theory in general. The distinction between common and determined noun phrases is of fundamental importance within most hitherto proposed formulations of Extended Standard Theory—e.g. Chomsky (1957, 1965, 1975), Katz and Postal (1964), Jackendoff (1972, 1977), and Formal Semantics—e.g. Montague (1970, 1973), Lewis (1972), Bennett (1974, 1976), Keenan and Faltz (1978, 1980), Barwise and Cooper (1981), Keenan and Stavi (to appear). The existence of languages—those characterized here as mass—in which this distinction is not viable, calls into question the universal validity of these theories of language, at least as currently proposed.  

The possibility that languages may vary in the degrees to which they distinguish common and determined (or count and mass) noun phrases
has, occasionally, been acknowledged. Weinreich (1963:161), for example, notes that "whereas in a language like English the specification of the kind of reference, divided or non-divided, is obligatory for the noun, in most languages it seems to be optionally marked". Lyons (1977: 465) suggests that such differences may not necessarily be superficial morphological ones, writing that "it is, to say the least, a defensible point of view that the distinction between determiners, quantifiers and classifiers is one that is drawn differently, not only in the surface structure, but also in the deep structure of different languages". The most extensive development of these ideas to date is--to the best of my knowledge--to be found in Stein (1981), who proposes an explicit formal semantics for Thai, based on its characterization as a mass language, not distinguishing between common and determined noun phrases.

The results of this chapter--in particular, the cross-linguistic distribution of adnominal distributive numerals--lend further support to the claim that the degree to which languages distinguish between common and determined noun phrases (or, equivalently, count and mass nouns), is a parameter along which languages may vary. Impressionistically, in fact, there would appear to be at least as many mass languages as count; English, in this respect, may end up finding itself in a minority. The further investigation of this language typology, its grammatical correlates and, also, its theoretical implications, is a research task of primary importance facing any theory of natural language semantics.
Footnotes - Chapter 9

1 Some of the forms cited in (1b) are, admittedly, somewhat awkward—perhaps for reasons similar to those discussed in footnote 5 chapter 5. Apparently, the corresponding series of adnominal numerals (in languages that have them) are less awkward.

2 It may be queried why Tagalog tigtatlong beses is characterized as a distributive numeral, while the corresponding English expression three times each is not. One reason not to characterize the English expression as a distributive numeral is that to do so would obscure the obvious syntactic affinity between it and expressions such as three suitcases each not containing a distributive numeral. (Quite obviously, three ... each is not a distributive numeral, since it is not even a syntactic constituent.) A perhaps more cogent reason not to call three times each a distributive numeral is semantic. If it were a distributive numeral, it would violate a well motivated universal (Universal 16 section 9.3) whereby for every distributive numeral there exist constructions in which it distributes over its classifier head. In accordance with this universal, three times each should at least sometimes be interpretable as "sets of three times". But it is not. (Of course, there is an element of circularity in this argument that needs to be avoided: why not call three times each a distributive numeral and simply drop universal 16? However, since Universal 16 is unequivocally valid for all unquestionable instances of distributive numerals, it would seem to be methodologically sound to take Universal 16 for granted and use it to adjudicate the status of more questionable instances of distributive numerals, as suggested here.)

3 Again, it may be queried why Tagalog ikaikatlo is characterized as an ordinal distributive numeral, but not the synonymous English expression every third. In the case at hand, it is questionable whether every third, e.g. in every third man, is indeed a constituent. The different word order of its Hebrew translation kol ith sli "every man third-m" would seem to provide some support for the claim that it is not a constituent. Moreover, it would seem possible to provide an adequate semantics for every third compositionally, in terms of the semantics of every and third—without recourse to a specific relation of distributivity.

4 It is interesting to see in what ways languages fail to have non-numerical distributive quantifying expressions. In some languages, application of the appropriate morphosyntactic strategy simply yields an ungrammatical result. Thus, for example, Turkish üç "three", üçer "three-dist", gök "many", but çoker "many-dist". Similarly, English three, in threes, many, but "in manies. In other languages, the expected form is grammatical, but not semantically distributive. Thus, for example, Bura mazâk "three", mazâmakâr "dist-three", han "many", but hanhan "very many"—with reduplication bearing an augmentative rather than a distributive effect.

355
Interestingly, some languages distinguish between adnominal and adverbial distributive interrogative quantifiers, e.g. Turkish kaçar "how many each", kaçar kaçar "how many at a time". As noted in section 6.5.1, Tagalog has an even wider variety of distributive interrogatives, including restrictive and ordinal quantifiers.

In view of the existence of adverbial distributive interrogative quantifiers, it is all the more surprising that languages with adverbial (but not necessarily adnominal) distributive numerals are prevented from having distributive interrogative quantifiers by Universal 5—e.g. English *in how many.

I am aware of one partial exception to Universal 7: In Latin, the first two distributive numerals are formed by suppletion—singuli "one-dist" from unus "one", bini "two-dist" from duo "two", subsequent distributive numerals being formed in accordance with Universal 7, by suffixation of -n and morphophonemic adjustments.

Iconicity thus offers a likely diachronic source for distributive numerals formed by reduplication. This may be illustrated by the following anecdote. Outside a soccer stadium in Israel, another spectator and I each paid for one sandwich at a food stall. The vendor then took one sandwich in each hand, held them out at us, and said ehad ehad "one one".

In Hebrew, ehad ehad is an adverbial distributive numeral—Hebrew has no distributive numerals of the adnominal variety. However, in the present context, it was clearly not being used adverbially. The reason is clear: if it were, it would be interpreted as "one by one" or "one at a time". But obviously the vendor did not intend for us to walk off with his entire stock of sandwiches.

What he meant was "one for you and one for you"—or, more simply, "one each", involving distributivity of individual sandwiches over the two intended recipients. The vendor's actual utterance, "one one", was elliptical for "one for you and one for you". In standard Hebrew this would perhaps constitute unacceptable ellipsis; however, in a lower register, and accompanied by a vivid gesture, the utterance was perfectly clear. The vendor's innovative use of reduplication thus resulted in an iconic custom-made distributive numeral in Hebrew, which—judging from the semantics—would have had to have been adnominal.

It may be speculated that distributive numerals formed by reduplication arise through the grammaticalization of such iconic discourse strategies.

One particular instance of this is the use of reduplication to form higher cardinal numerals from lower ones—the higher numeral being envisioned as resulting from repetition of the referent of the lower numeral:
(i) **Kutenai**  (Greenberg 1978:291)

- yitwu → yitwunwu   "one hundred"
- yitwu → yitwul-yitwunwu   "one thousand"
- yitwu → yitwul-yitwul   "ten thousand"
- "ten"

(ii) **Ibanag**  (Blake 1907:212)

- ribu → riburibu   "one hundred thousand"    "one million"

(iii) **Hebrew**

- rov → revava   "most"    "ten thousand"

Since, in these cases, reduplication does not form a different numeral series, examples such as these do not violate Universal 8.

A more interesting state of affairs obtains in the Australian language Gidabal (Geytenbeek and Geytenbeek 1971:6). In Gidabal, the numeral ḫuruk "two" may be reduplicated; the resulting numeral ḫuruk-ḫuruk may be interpreted in two ways—either as a distributive numeral "two-dist", or as a cardinal numeral "four". The Gidabal facts clearly attest to the close relation between distributivity and plurality—see below.

An apparent counterexample to universal 9 is offered by the Tagalog plural marker mga, which is used to form approximatives—e.g. mga tatio "about three". It is questionable, however, whether approximative numerals are to be considered as a distinct series, or, rather, as particular values of numerals within the cardinal series.

It should be noted that pluralization—like reduplication, cf. footnote 8—is often used to form higher cardinal numerals from lower ones:

(i) **English**

- a. ten → tens
- b. hundred → hundreds
- c. thousand → thousands

(ii) **Hebrew**

- a. ehad → aḥadim   "one"   "several"
- b. ḥasarə → ḥasarot   "ten"   "tens"
- c. ḥasarə → ḥesrim   "ten"   "twenty"
d. sloša → slošim
   "three" → "thirty"

e. arbaša → arbašim
   "four" → "forty"

f. revava → revavot
   "ten thousand" → "tens of thousands"

(iii) **Proto River-Californian Yuman** (Langdon and Munro 1980:123-127)

xu →  ý-c-xu-m-pa-p

two → pl-two-ds-all-?

"two" → "four"

Since the derived forms are all cardinal numerals, none of the above examples violate Universal 9.

The similarity between the data in this footnote and the previous one underscores the close relationship between plurality and reduplication, as reflected, also, in the formation of distributive numerals.

Lest such generalizations appear too obvious to justify serious deliberation, it should be noted that quite often, morphology fails to be so well behaved. Consider, for example, the standard cases of verbal inflectional morphology in a synthetic language, where the meaning of a morphologically primitive affix, e.g. French -ions, may combine features from diverse categories, such as aspect (imperfect), person (first), and number (plural)—no constituent part of the suffix -ions corresponding to any one of these features. Universals 10 and 11 below thus make substantive claims about possible natural languages, by stipulating, say, that a marker of distributive restrictive numerals may not be morphologically primitive—like French -ions—but must instead be transparently analyzable into markers for distributive and for restrictive numerals.

The place of English adverbial distributive numerals in threes and three by three in the scheme of (22) poses an interesting question—the following two alternatives suggesting themselves. The first alternative is to posit a null $S_{adv}$, deriving the distributive numeral forms entirely through $S_{dist}$. The second alternative is to use $S_{adv}$ to account for the prepositions in and by—this being motivated by their productive use in the formation of (non-numerical) adverbial prepositional phrases. $S_{adv}$ would then be invoked to account for the plural marker -s in the former case, and for reduplication in the latter. The choice between these two alternatives appears to me to be moot. In the remainder of this section, we shall assume the first alternative, for sake of simplicity.
Of course, for such ordering arguments to carry any weight, some notion of "natural morphosyntactic process" is a prerequisite. For example, in (27a), titlolololol could conceivably be derived from *atlatolatlo by applying ti- twice—both word-internally and word-initially at the same time. Presumably, such a derivation is less natural—all the more so since it proceeds by way of an intermediate stage (*atlatio) that is ungrammatical, whereas the corresponding intermediate stage in the proposed derivation (titlo) is perfectly grammatical.

One possible counterexample to this generalization is the following:

1. **Russian**

```
\( \begin{array}{c}
\text{tri} \\
\text{troje}
\end{array} \xrightarrow{\text{adv}} \begin{array}{c}
\text{po tri} \\
\text{po troje}
\end{array} \xrightarrow{\text{dist}} \begin{array}{c}
\text{adv} \\
\text{adv}
\end{array}
\)```

Presumably, morphological stragegies—e.g. \( \text{adv} \), must apply before syntactic ones—e.g. \( \text{dist} \).

I am not at all clear, however, as to the status of po troje as an adverbial distributive numeral. In particular, troje itself is not a contextual variant of tri, but, rather, an absolute variant—in fact, a so-called collective numeral.

The form tigtatotatlo is of course acceptable, not as a distributive restrictive numeral but as an ordinary distributive numeral of series 2 (cf. (8) section 6.2.1). Reduplication of initial syllable is thus ambiguous between a device forming restrictive numerals (i.e. \( \text{rest} \)) and part of a strategy for forming distributive numerals. As noted in footnote 11 chapter 6, the same ambiguity is also characteristic of two-syllable reduplication in Tagalog.

Several languages do, in fact, have numerals which are characterized as "collective"—cf. (1) section 3.1.2. But in the two cases that I have had occasion to examine—Hebrew and Russian—so called collective numerals allow either individual or collective interpretations of the NPs in which they occur, thereby indicating that, at least, do not constitute the sought after counterexample to Universal 14 represented by three.

The following anecdote illustrates this vividly. When I first became aware of the existence of distributive numerals, I had no a priori expectations as to whether they marked constituents distributing, or—like three—constituents distributed over. My first question, put to a speaker of Tagalog, was therefore whether sentence (1a) chapter 2 involved two men and between three and six suitcases (as it does), or between two and six men and three suitcases (as it does not, but would if tigtatlo were three).
17 Of course, some languages may also have distributive universal quantifiers occurring in the constituent distributing—e.g. Georgian g'vel-g'vela, Maricopa matʃæ'mutʃæŋka.

18 The place of the Maricopa verbal distributive suffix -xper in this classification is worthy of comment. Distributive numerals formed with -xper distribute over their classifier heads, in accordance with Universal 16; however, due to the peculiar syntactic structure of Maricopa—cf. section 8.1—this distributivity is clausal, rather than phrasal, as for most other languages. Maricopa -xper may thus simultaneously uphold the above generalization that verbal markers of distributivity induce clausal rather than phrasal distributivity.

19 Following is a possible line of thought. Consider the following sentence:

(i) John and Bill carried sticks and suitcases in threes

Universals 17 and 18 allow for interpretations (ii/a) and (ii/b) of (i) while ruling out interpretations (ii/c) and (ii/d):

(ii) a. **Phrasal Distributivity over Classifier Head**

John and Bill carried sticks and suitcases in sets of three

b. **Clausal Distributivity over Verbal Phrase**

John and Bill carried sticks and suitcases three at a time

c. **External Distributivity**

*John and Bill carried three sticks and three suitcases

d. **Clausal Distributivity over Subject NP**

*John and Bill each carried three sticks and suitcases

What do (ii/a) and (ii/b) share, to the exclusion of (ii/c) and (ii/d)? The answer, it would seem, may be that in (ii/a) and (ii/b), the effect of the distributive numeral in threes is to impose an organization of the NP sticks and suitcases—spatially in (ii/a), temporally in (ii/b). Conversely, in (ii/c) the distributive numeral changes the denotation of sticks and suitcases in a more substantial way (by affecting its cardinality), while in (ii/d) it affects the interpretation of the subject NP. I do not know if and how these observations may be formalized and incorporated into an explanation for Universals 17 and 18.

20 Some possible counterexamples to Universal 19 must be acknowledged. First, as noted in section 5.2, the English adverbial distributive numerals in threes and three by three differ with respect to the preferences they entail: in threes allowing either phrasal or clausal distributivity, three by three inducing a preference for clausal distributivity. But since both distributive numerals allow both domains (albeit with different preferences), this is not a bona fide counterexample to Universal 19.
An apparently more serious counterexample to Universal 19 may be found in Tagalog, where--cf. (30) section 6.3.2--adverbal distributive numerals may occasionally be used in adnominal position:

(i) a. Tigtatlong lalaki ang pumanta sa mga parti
    dist-three-lig man top went-AT obl pl party
    "The going to the parties by the men was three each"

b. Tatlu-tatlong lalaki ang pumanta sa mga parti
    dist-three-lig man top went-AT obl pl party
    "The going to the parties by the men was in threes"

While (i/a) with adnominal distributive numeral tigtatlo allows for an interpretation where tigtatlong lalaki distributes clausally over the NP sa mga parti (hence, each party had three men go to it), (i/b) with adverbal distributive numeral tatlu-tatlo in adnominal position does not allow such an interpretation. There thus exists a clear semantic difference between (i/a) and (i/b).

However, constructions such as (i/b) are clearly derived, and are less productive than the constructions in (i/a). In that sense, at least, the syntax of the two distributive numerals tatlu-tatlo and tigtatlo is quite different--hence failing to meet the condition of identity imposed by Universal 19. Thus, while a more detailed examination of constraints such as (i) is required, it would seem that they, too, do not constitute true counterexamples to Universal 19.

21 Of course, both the syntax of adnominal distributive numerals and the semantics of quantifier scope need to be "hedged", in the sense that the grammatical relations hierarchy stipulates preferences, rather than categorial yes/no judgements. In fact, Universal 20 may readily accommodate non-discrete syntactic and semantic judgements--simply by appropriately qualifying the word "may" wherever it appears in the formulation of Universal 20.

22 More precisely, the fact that determiners never distribute over their heads is a consequence of their logical type, i.e. functions from a boolean algebra into its power set algebra; see Keenan and Stavi (1982) for the appropriate proofs.

23 The reason Table 3 contains a smaller sample of languages is quite simple: without detailed investigation, it is impossible to assert with confidence that a language has no adnominal distributive numerals. Even if three or four reference grammars of a language do not mention adnominal distributive numerals, it cannot be concluded that there are none; many (most) grammar books simply do not consider the existence of distributive numerals worth acknowledging. The small size of my sample of languages without adnominal distributive numerals is therefore due mainly to my own ignorance on the matter.
One promising avenue of investigation would appear to be diachronic. For example, in the course of the development of Old French from Latin, it would seem to be the case that the use of indefinite and definite articles arose during approximately the same era in which the Latin adnominal distributive numerals were being replaced by the periphrastic constructions typical of French (cf. Brunot 1966:187). If, indeed, developments such as these can be shown to have taken place concurrently, this would provide strong additional support for Universals 21 and 22, and the resultant language typology.

One additional correlate would appear to be the productive use of numeral classifiers, characteristic of mass languages—cf. Stein (1981). A second typological correlate of the count/mass distinction may perhaps be the value of the semantic parameter NS defined in Gil (1982a, to appear c), reflecting the availability of non-symmetric quantifier scope interpretations. Consider the following sentences, all glossable, roughly, as "Three boys saw two girls":

(i) a. Dutch
   Drie jongens zagen twee meisjes
   three boys saw-pl two girls

b. Hebrew
   šloša banim ra' u štey banot
   three-m boys saw-3pl two-f girls

c. Bengali
   Tīntī c'hēlē duṭi mēyēkē dēk'h ec' il
   three-class boy-nom two-class girl-acc saw-3

As documented in Gil (1982a, to appear c), the acceptability of non-symmetric interpretations (e.g. in which there are three boys and 2 x 2 = 6 girls) decreases from Dutch through Hebrew to Bengali—i.e. NS(Dutch) > NS(Hebrew) > NS(Bengali). It may be speculated that high values of NS correlate with count languages—e.g. Dutch, whereas low values of NS correlate with mass languages—e.g. Bengali.

It may, perhaps, be more appropriate to assign values of NS to particular expressions, rather than to languages as a whole. For example, (i) might support the following NS values for the appropriate numerals in Dutch, Hebrew and Bengali: NS(drie) > NS(šloša) > NS(tīntī). That is to say, Dutch drie "three" is more likely to allow the NP within which it occurs to have wider scope than another NP than is Hebrew šloša "three-m", which in turn is more likely to permit such a scope dependency than is Bengali tīntī "three-class". The appropriate generalization would then be that numerals belonging to the category of determiner have higher NS values than numerals belonging to the category of noun, adjective, or verb. (Of course, since mass languages have no numerals belonging to the category of determiner, they are less likely to have expressions of high NS value.)

362
Striking support for the above generalization is provided by constructions involving universal quantification in Hebrew. Note, first, that the difference between English every and all is, inter alia, one of NS value: NS(every) \( \supset \) NS(all). This is because every forces another constituent to distribute over the NP within which it occurs, whereas all--although allowing distributivity--does not force it. Observe, now, that when every and all are translated into Hebrew, they are rendered with the same lexical item, kol, but in different types of constructions:

(ii) a. kol yeled
   boy
   "Every boy"

b. kol hayeladim
   the-boys
   "All (the) boys"

While in (ii/a), kol would appear to be a determiner, in (ii/b) the presence of the proclitic definite article ha- indicates that kol is other than a determiner. In Hebrew, then, the NS value of the universal quantifier kol is encoded by the type of construction in which kol occurs--in accordance with the generalization proposed above governing NS values and the syntactic categories of various expressions. To wit, determiner kol in (ii/a) has NS value like determiner numeral drie in (i/a), while nominal kol in (ii/b) has low NS value like numeral plus classifier expression tinti in (ii/c).

I have no explanation for these facts.

Arguably, the centrality of the common/determined noun phrase distinction in most current linguistic theories is due to one of those historical accidents that affect the course of scientific research--namely, that these theories were in most part developed by speakers of count languages, primarily English. Remarkably, Ajdukiewicz (1935), who first developed the notion of categorial grammar, did not distinguish between common and determined noun phrases: his native language, Polish, does not make this distinction either.
Chapter 10

10. Conclusion

Back on page 1, it was queried why anyone should wish to study distributive numerals. Hopefully, the results of this dissertation speak for themselves—providing an answer to this rhetorical question. I do not intend to recapitulate these results here. Instead, I would like to conclude by emphasizing, once again, an important methodological theme running through the present study—namely, the need to examine data from a wide range of typologically different languages, as part of establishing an empirical foundation upon which an adequate linguistic theory may be based.

Imagine a hypothetical linguistic theory based exclusively on the study of English. With ingenuity, it might be possible to divine various subtle linguistic universals, e.g. the Specified Subject Condition (Chomsky 1973). However, it is doubtful whether such a theory would have a place for adnominal distributive numerals—English providing not the slightest clue that such linguistic creatures may exist. But how great a loss to linguistic theory would this be? (After all, many grammar books get along very well without mentioning them...) Perhaps, though, the loss would be substantial. Consider the following:

(1) a. Two men carried three suitcases each
   b. Two men carried the suitcases in threes

With recourse limited to English, it is questionable whether the existence of a certain logical affinity between the above sentences would
receive due attention, or even be noticed. English morphology and syntax offer no assistance: three suitcases each does not closely resemble suitcases in threes. Speakers of English are subsequently surprised to find that the above two sentences may be translated into one and the same sentence in Georgian:

(2) Orma k'acma sam-sami ɣanta c'aiyo
two-erg man-erg three-dist-nom suitcase-nom carried-3sg

In the Georgian sentence, both three suitcases each and the suitcases in threes are rendered by a single construction involving an adnominal distributive numeral—sam-sami ɣanta. The Georgian adnominal distributive numeral sam-sami thus brings to light a logical affinity between the superficially dissimilar English expressions three ... each and in threes—namely, that both expressions induce a relation of distributivity, albeit over different syntactic domains. Georgian adnominal distributive numerals thus provide a crucial clue to the proper understanding of sentences such as (1) in English; a linguistic theory without recourse to adnominal distributive numerals would—to this extent, at least—be an impoverished one.

The same point can be made over and over again. For example, English morphology and syntax provide no indication of any logical affinity between the following expressions:

(3) a. Three suitcases each
   (as in Two men carried three suitcases each)
   b. Heavy suitcases
   (where suitcases is interpreted individually)

However, their Georgian translations both contain reduplicated expressions:
(4) a. Sam-sami  \( \text{canta} \)  
   three-dist-nom suitcase-nom  
b. \( M_\text{dim} \- M_\text{dime}  \)  \( \text{cantebi} \)  
   heavy-dist-nom suitcases-nom

The shared morphological marking in (4) reflects the shared semantic feature of distributivity—obtaining clausally in (4a), phrasally in (4b). It thus suggests that the same semantic feature may be shared also by the corresponding English expressions in (3). Again, Georgian morphology helps understand English logic. Adnominal distributive numerals and related expressions in Georgian thus provide important clues as to the nature of distributivity in universal grammar, and, ipso facto, in English.

It is thus clear that our hypothetical linguistic theory based solely on English would be severely handicapped by its not having at its disposal constructions involving adnominal distributive numerals. More generally, such a theory would be hard put to distinguish between language universal properties—e.g. the semantic relation of distributivity obtaining over a variety of syntactic domains, and language particular properties that happen to be possessed by English—e.g. the distinction between common and determined noun phrases. Our English based linguistic theory would thus seem to have little to recommend for itself.

Is it not the case, however, that this hypothetical theory based exclusively on the study of English is a mere paper tiger? The reader may judge the degree to which this "hypothetical" theory is in fact resembled by the various linguistic theories currently in the market—since, in the introduction, I promised to try to stay clear of polemic, I will refrain from offering my own judgements on the matter. Be this
as it may, I hope in this dissertation to have demonstrated that the study of a wide range of languages is a sine qua non not only in phonetics, phonology, morphology, and syntax, but also in semantics— even in its more "logical" (or less "culturally determined") branches. In doing so, I hope to have also established a prima facie case for the importance of research into the structures of diverse natural languages, as part of a broader study of man's cognitive capacities, including the mental faculty of mathematical reasoning.
Bibliography


Akiba, Katsue (1976) A Typological Sketch of Japanese, Ms., UCLA.


Gil, David (to appear a) 'Intuitionism, Transformational Generative Grammar and Mental Acts', *Studies in History and Philosophy of Science*.

Gil, David (to appear c) 'Quantifier Scope, Linguistic Variation, and Natural Language Semantics', Linguistics and Philosophy.


375


Mauthner, Fritz (1901-1902) Beiträge zu einer Kritik der Sprache, Cotta, Stuttgart.


Mazaudon, Martine (1976) Typological Sketch of Tamang, Ms.


376


Poppe, Nicholas (1964) Grammar of Written Mongolian, Otto Harrassowitz, Wiesbaden.


